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EMISSIONS SCENARIOS

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Appendix

Report of the Expert Group

on Emissions Scenarios

(RSWG Steering Committee, Task A)

April, 1990

ORGANIZATION OF THIS APPENDIX

This appendix is organized into two parts. Part One, prepared by the United States, discusses the development of the scenarios using the Atmospheric Stabilization Framework (ASF), which was developed by the U.S. Environmental Protection Agency. Part Two, prepared by the Netherlands, discusses the development of the scenarios using the Integrated Model for the Assessment of the Greenhouse Effect (IMAGE), which was developed by Rijksinstituut Voor Volksgezondheid En Milieuhygiene (RIVM), the research institute for the Netherlands' Ministry of Housing, Physical Planning and Environment.

Appendix of the Expert Group on Emission Scenarios of the Response Strategies Working Group of the Intergovernmental Panel on Climate Change

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INTRODUCTION

This appendix is part of a report on emissions scenarios prepared in response to a directive by the Response Strategies Working Group (RSWG) of the Intergovernmental Panel on Climate Change (IPCC). At the first meeting of the RSWG, held at the U.S. State Department January 30 through February 1, 1989, the U.S. and the Netherlands were asked to develop preliminary net emissions profiles for several scenarios of future global climate change. These scenarios were not intended to be forecasts of possible development outcomes or of likely policy options, but would serve as a first step in the analysis of a plausible range of global climate change scenarios, as requested by IPCC Working Group #1. Additional scenarios are likely to be developed once policies that respond to the threat of global climate change are formulated or adopted. The initial four emission scenarios are: (1) a **2030 High Emissions** scenario, in which an equivalent doubling of CO_2 ($2xCO_2$) from pre-industrial levels occurs by about the year 2030; (2) a **2060 Low Emissions** scenario, in which the equivalent doubling of CO_2 occurs by the year 2060; (3) a **Control Policies** scenario, in which equivalent CO_2 concentrations approaches a doubling in the year 2090, with stabilization of atmospheric concentrations thereafter; and (4) an **Accelerated Policies** scenario, in which equivalent CO_2 concentrations are kept well below a doubling level for the duration of the next century.[1]

For each scenario, there are many equally plausible yet divergent paths that the world could take to reach the equivalent CO_2 doubling level. To capture some of these uncertainties, two detailed scenarios were constructed for each of the four emission scenarios to bracket the most likely range of possible futures. To build these eight detailed scenarios, several key variables were altered to obtain the target equivalent CO_2 levels. One of the most important variables was the future rate of economic growth, with a higher and lower rate of economic growth (based on the annual rate of change in Gross National Product, or

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[1] Equivalent CO2 concentration refers to the concentration of CO_2 that by itself would produce the equivalent radiative forcing of the realized levels of all of the important greenhouse gases.

GNP) specified for each scenario. As a result, a Higher Growth scenario and a Lower Growth scenario will provide labels throughout this report for the specific assumptions compiled for the two detailed scenarios provided for each emission scenario. Other variables that were altered to construct the emission profiles for each scenario include oil prices, type and amount of energy supply, type and amount of energy demand, production and use of CFCs, deforestation and reforestation, and agricultural production. Since some purposes may be best served by providing only one scenario for each emission profile, in addition to the Higher and Lower Growth scenarios, emissions and atmospheric concentration estimates are also presented for an Average scenario, which is simply an average of the Higher and Lower Growth model results. Finally, an alternative (lower) CO_2 emission estimate was derived for the Accelerated Policies scenario, in order to examine the impact of lower CO_2 emissions from the energy sector. Thus, a total of 13 emission scenarios were analyzed; the two detailed scenarios (Higher and Lower Growth) associated with each of the four emission scenarios (eight), plus the four Average scenarios, plus the Alternative Accelerated Policies scenario.

In constructing these scenarios, there are several variables that were not manipulated to reach the designated emission profiles. Foremost among these variables is the rate of global population growth. As discussed further below, the population estimates were derived from World Bank projections and have been used for all cases. Also, the extraction costs and availability of fossil fuel resources have not been varied globally, i.e., alternative assumptions on the size of the fossil fuel resource base have not been examined. Other key variables that have not been altered from one scenario to the next include, among others, the starting emission budgets for each greenhouse gas, the atmospheric response to changing greenhouse gas concentrations, the uncontrolled emission rates from energy production and consumption (as discussed below, emission controls were assumed in some cases), and basic lifestyle preferences (e.g., average number of miles driven per year was not altered).

The primary tool used to develop these scenarios is the Atmospheric Stabilization Framework (ASF), an integrated analytical framework of models developed by the U.S. Environmental Protection Agency (U.S. EPA) to organize the data and assumptions required to calculate (1) emissions of radiatively and chemically active gases, (2) concentrations of greenhouse gases, and (3) changes in global temperatures. The ASF is highly simplified, as its primary purpose is to rapidly scan a broad range of policy options in order to test their general effectiveness in reducing atmospheric concentrations of greenhouse gases. The model framework permits an analysis of how certain factors (e.g., population growth, economic growth, and technological change) affect the emissions of all the important greenhouse gases. With the ASF it is possible to estimate the impact of changes in these factors on the composition of the atmosphere and global temperatures. The results of more sophisticated models were used to construct individual components of the ASF (see **ANALYTICAL FRAMEWORK**, below, for further discussion). To examine other aspects of the trace-gas emission profiles, the Integrated Model for the Assessment of the Greenhouse Effect (IMAGE), described in Part Two of this appendix, was also used to analyze the scenarios.

ANALYTICAL FRAMEWORK

The ASF consists of four emissions modules (energy, industry, agriculture, and land use and natural sources) and two concentration modules (atmosphere and ocean) as shown in Figure 1. The four emissions modules use input data, including scenario specifications for population growth, GNP, energy efficiency, agricultural productivity, and rates of deforestation, to estimate emissions of greenhouse gases for nine regions of the globe (see Figure 2). Emissions are calculated every 5 years from 1985 to 2025 and then every 25 years through 2100, based on activities that generate the gases. Emissions of the greenhouse gases carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and a number of halocarbons are explicitly calculated within the Framework. Emissions of carbon monoxide (CO) and nitrogen oxides (NO_x), which are not themselves greenhouse gases, are also explicitly calculated, since these gases can

Figure 1

STRUCTURE OF THE ATMOSPHERIC STABILIZATION FRAMEWORK

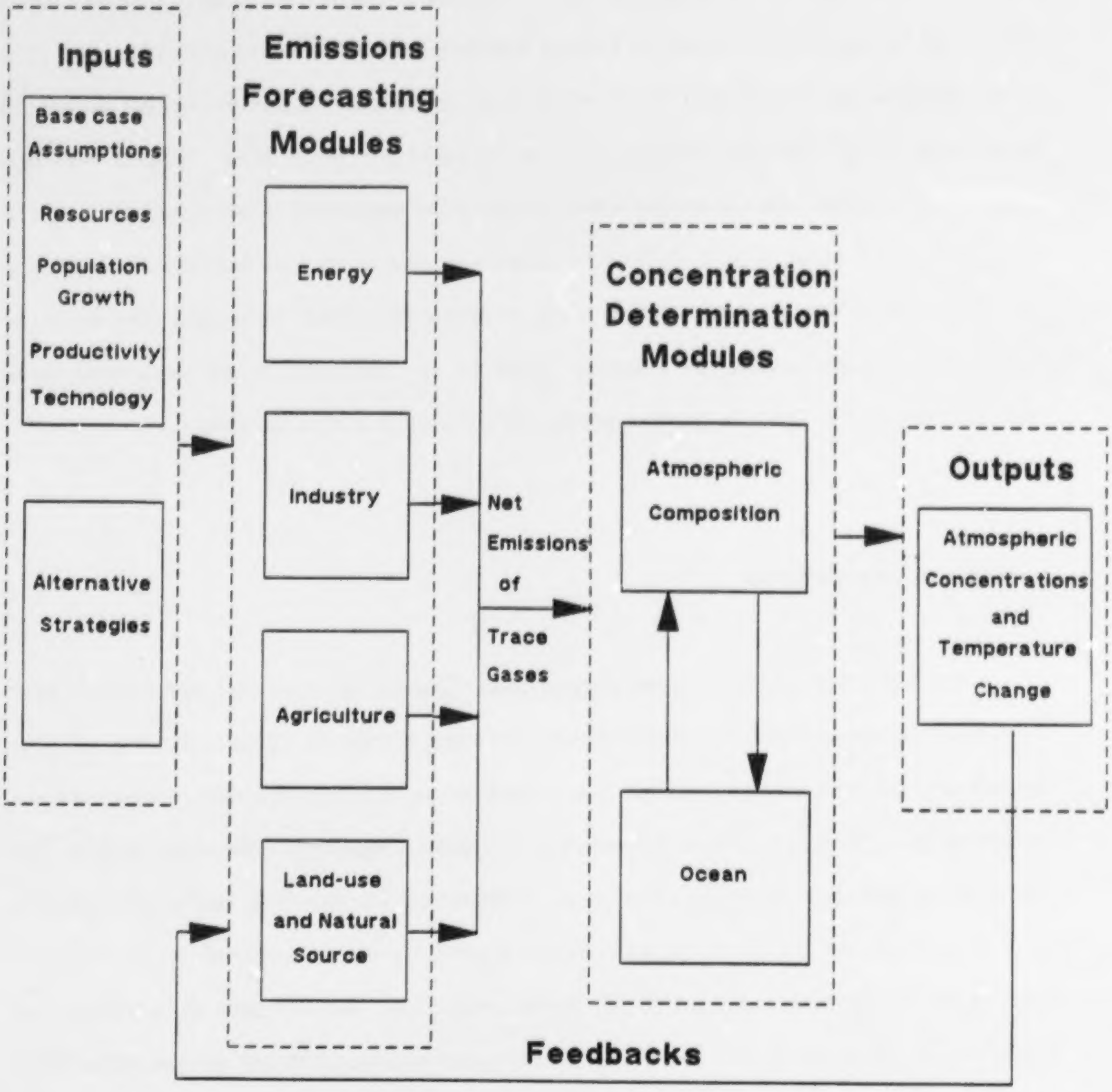
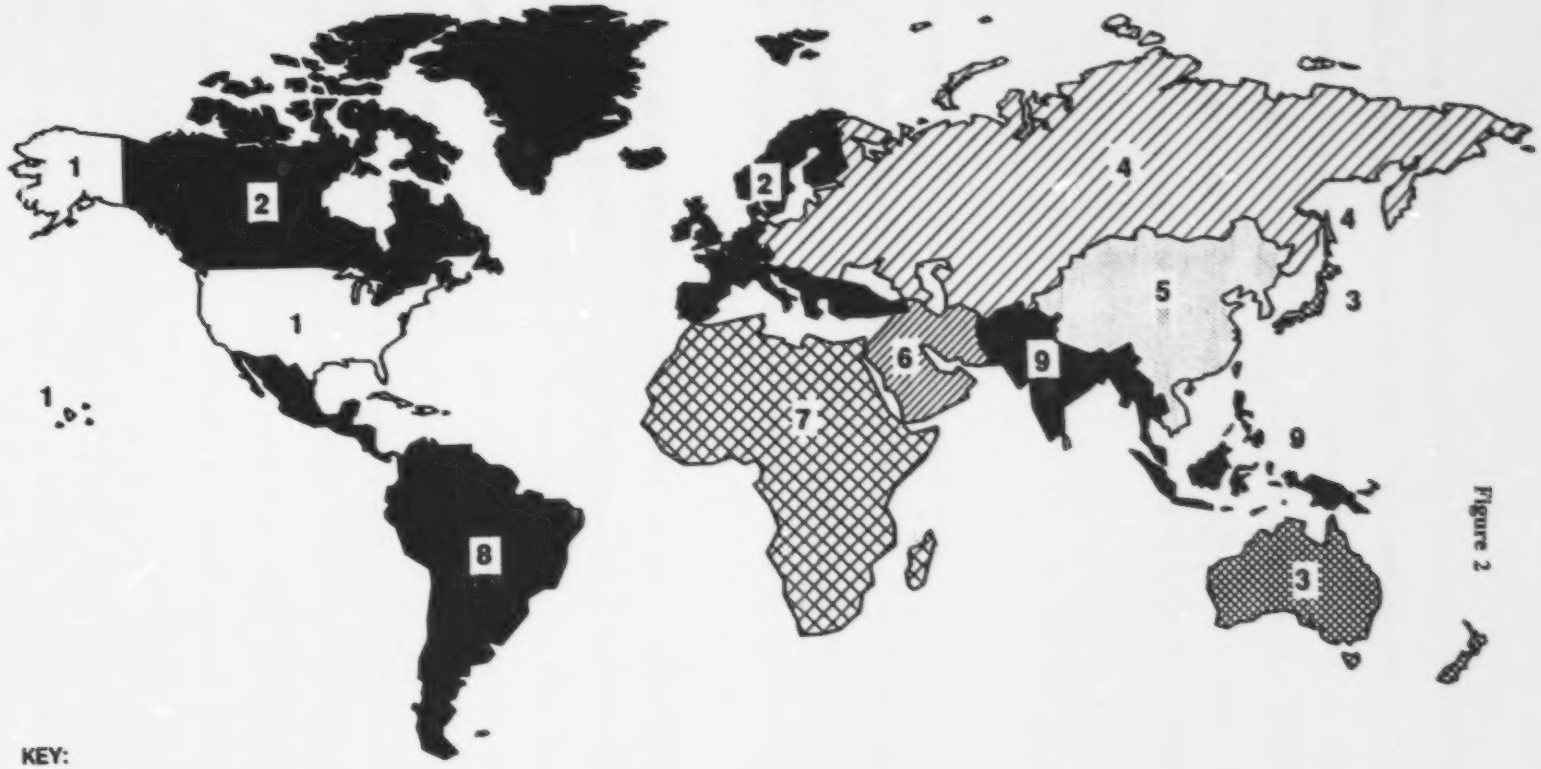

Inputs
Base case Assumptions
Resources
Population Growth
Productivity
Technology
Alternative Strategies
Emissions Forecasting Modules
Energy
Industry
Agriculture
Land-use and Natural Source
Net Emissions of Trace Gases
Concentration Determination Modules
Atmospheric Composition
Ocean
Outputs
Atmospheric Concentrations and Temperature Change
Feedbacks

Figure 2



KEY:

1. United States
2. OECD Europe/Canada
3. OECD Pacific
4. Centrally Planned Europe
5. Centrally Planned Asia
6. Middle East
7. Africa
8. Latin America
9. South and East Asia

Source: Adapted from Edmonds & Reilly, 1983a, in Mintzer, 1988.

significantly alter the chemistry of the atmosphere and thus affect concentrations of the greenhouse gases. The concentrations of other greenhouse gases, such as water vapor and ozone, are calculated implicitly or explicitly as a function of the other gases. The atmospheric composition and ocean modules together estimate global concentrations of the greenhouse gases resulting from the projected emissions, and increases in global temperatures resulting from the calculated concentrations. The atmospheric trace-gas concentrations and temperatures affect the emissions and concentration modules in the next time period.

Energy Module

The energy module consists of a Global Energy Supply Model (SUPPLY), which is based on the energy-CO_2 model of Edmonds and Reilly (1983a, 1984) and was modified by ICF Inc. for this study; a global energy end-use analysis (DEMAND), conducted by the World Resources Institute and Lawrence Berkeley Laboratories; and combustion emission coefficients developed by Radian Corporation (1987).

DEMAND estimates energy consumption based on specific assumptions about the level of energy-using activities and technical efficiency by region and sector (industry, transportation, buildings). Although this analysis provided more detail than most previous global studies, this level of aggregation obscures many important variations, particularly for developing countries. For example, within the South and East Asia region, per capita incomes vary from $150 (Bangladesh) to $7000 (Singapore). The share of energy used by the manufacturing sector, vehicle ownership levels, and types of fuels used (particularly the importance of biofuels), all vary from one economy to another. In conducting the analysis we capture some of this diversity by examining energy use by region and by income groups within each region. Detailed analysis was performed for 2025 to anchor the demand estimates calculated for other years using SUPPLY.

SUPPLY includes estimates of energy resources and costs by region and can balance supply and demand using a highly-aggregated estimate of demand as a function of price and income. Supply-demand equilibration takes place within SUPPLY, which projects fuel mix and final prices. Trace-gas emissions are calculated by allocating the final fuel consumption among the individual combustion technologies for which emission coefficients are available. Additional emissions associated with fuel production are also estimated.

Industry Module

The industry module consists of a CFC model and a model for other non-combustion trace-gas sources. The CFC model was developed by the U.S. EPA for use in assessing stratospheric ozone depletion (U.S. EPA, 1987). It projects production and emissions of the following compounds: CFC-11, CFC-12, HCFC-22, CFC-113, CCl_4, CH_3CCl_3, CH_3Cl, CH_3Br, CF_4, Halon 1211, and Halon 1301. Other industrial sources of trace gases include landfilling (CH_4) and cement production (CO_2). Emissions from these activities are estimated as a simple function of population and per capita income.

Agriculture Module

The agricultural module uses the IIASA/IOWA Basic Linked System, or BLS, (Frohberg, 1988) to forecast fertilizer use and agricultural production. These estimates are used with emission coefficients derived from the literature to calculate emissions of N_2O from nitrogenous fertilizer use, CH_4 from rice production, CH_4 from enteric fermentation in domestic animals, and emissions of CH_4, N_2O, NO_x, and CO from burning of agricultural wastes.

Land Use and Natural Source Module

The land use and natural source module consists of components dealing with emissions due to land-use change and natural sources of trace gases. The most important of these is carbon dioxide (CO_2)

released from deforestation, which is projected with the Marine Biological Laboratory/Terrestrial Carbon Model, or MBL/TCM, (Houghton et al., 1983) based on assumptions about future rates of land clearing. Other anthropogenic emissions related to land clearing, such as a portion of CO emissions from biomass burning and N_2O emissions from land disturbance, are scaled based on the CO_2 emissions calculated by the MBL/TCM. Natural emissions of CO, CH_4, N_2O, and NO_x from sources such as forest fires, wetlands, soils, oceans, and fresh water are based on values from the literature; these generally are held constant throughout the projection period.

Ocean Module

Ocean uptake of heat and CO_2 are simulated in the ocean module using the box-diffusion approach introduced by Oeschger et al. (1975) as implemented for the Goddard Institute of Space Studies General Circulation Model, or GISS GCM (Hansen et al., 1984). The ocean mixing parameter for heat uptake is chosen to reproduce, as closely as possible, the timescales obtained in the time-dependent calculations with the GISS GCM (Hansen et al., 1988). Alternative ocean model formulations for CO_2, such as the Advective-Diffusive Model (Bjorkstrom, 1979) and the Outcrop-Diffusion Model (Siegenthaler, 1983), are included in the ASF and could be used for alternative estimates of CO_2 uptake. Total carbon uptake is calibrated using estimates of historical emissions of CO_2 from fossil fuels (Rotty, 1987a,b) and deforestation (Houghton, 1988). The atmospheric CO_2 concentration is assumed to be 285 ppm in 1800 and is forced to be equal to the values obtained at Mauna Loa for the period of record (1960-1985). The excess flux required to meet these conditions is calculated and held constant in the future at the average value for 1975-1985.

Atmospheric Composition Module

The atmospheric composition module was developed by Prather (1988). It estimates changes in the concentration of key atmospheric constituents and the global radiation balance based on the emissions/uptake projected by the other modules. Perturbations to atmospheric chemistry based on first-order (and occasionally second-order) relationships derived from more process-based chemical models and observations are incorporated into the model. Although it is essentially zero-dimensional, the model does distinguish between the northern hemisphere, southern hemisphere, troposphere, and stratosphere. Global surface temperature change is calculated based on the radiative forcing of the greenhouse gases as derived from Lacis et al. (1981) and Ramanathan et al. (1985) coupled to heat uptake by the ocean model using a specified climate sensitivity parameter.[2]

ASSUMPTIONS

As stated above, several key variables that affect emission levels were varied in order to develop the four emission scenarios. These variables include the rate of economic growth, oil prices, energy supply and demand, energy efficiency, rates of deforestation and reforestation, CFC and halon production and use, and agricultural activities. These assumptions are discussed below in greater detail.

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[2] For this analysis this climate sensitivity parameter has been set to yield a global equilibrium temperature increase of 3°C when the equivalent CO_2 concentration is doubled, reflecting a central estimate of the range of uncertainty. In other words, equivalent $2xCO_2$ corresponds to a 3°C temperature increase. This parameter affects the equivalent CO_2 level slightly through temperature-sensitive chemical feedbacks that are built into the model.

Population

The population estimates were taken from the World Bank (Zachariah and Vu, 1988) and were not varied among scenarios. Zachariah and Vu (1988) assumed that population growth rates in developing countries will begin to decline markedly after 2000, achieving a net reproduction rate of unity in every country by 2040. (A net reproduction rate of unity indicates that people of child-bearing age have children at a replacement rate; it eventually leads to a stable population level.) These estimates project a global population of 9.5 billion by 2050. Detailed population estimates for the nine global regions are summarized in Table 1.

Table 1
Global Population Levels Through 2100
(millions)

REGION	1985	2000	2025	2050	2075	2100
United States	239	267	289	285	283	284
OECD Europe/Canada	430	459	483	478	476	478
OECD Pacific	144	158	166	165	164	165
Centrally Planned Europe	416	454	500	521	536	545
Centrally Planned Asia	1140	1408	1728	1866	1919	1993
Middle East	111	171	277	359	399	411
Africa	570	872	1498	2026	2336	2436
Latin America	402	530	715	829	869	888
South and East Asia	1417	1858	2534	2998	3194	3281
World	4870	6176	8190	9528	10177	10421

Source: Zachariah and Vu (1988)

Economic Growth

For each of the four emission scenarios, a higher economic growth rate and a lower economic growth rate were specified in the detailed scenarios to capture the range of uncertainty in the rate of economic development worldwide. These higher and lower GNP growth rates were based on estimates contained in *World Development Report 1987* (World Bank, 1987) which provided Gross Domestic Product (GDP) forecasts for the 1986-1995 period by several different types of country groups. Most countries could be classified into one of three general categories--low income, middle income, or industrialized. In addition, the World Bank defined several other more select groups for which separate growth rates were estimated, including oil exporters, exporters of manufactures, highly indebted countries, and sub-Saharan Africa. For each of these country groupings, the World Bank provided a range of possible rates of growth for the 1986-1995 period. The lower rates of growth were used as a starting point for this analysis because these estimates were more consistent with recent historical trends and other forecasts. The initial World Bank estimates are summarized in Table 2.

Table 2
World Bank GDP Growth Assumptions: 1986-1995
(real average annual percent change)

Country Group	GDP Growth Rate
Low-income countries	4.6%
Middle-income countries	3.6%
Industrial countries	2.5%
Oil exporters	3.6%
Exporters of manufactures	4.3%
Highly indebted countries	3.5%
Sub-Saharan Africa	3.2%

Source: World Bank (1987).

To formulate economic growth assumptions for a Higher Growth scenarios, these initial values were generally increased by one-half percentage point for OECD countries and by one percentage point for developing and East Bloc countries to reflect the greater uncertainty regarding future growth in developing and centrally planned economies. The resulting growth rates were applied to the period 1985-2000, and were then generally reduced by one-half percentage point each 25-year period, beginning in 2000, to reflect structural change and the decline in population growth rates over time. The same approach was used for the Lower Growth scenarios, except that the initial estimates were generally decreased one percentage point for developing and East Bloc countries and one-half percentage point for OECD countries. (The Alternative Accelerated Policies scenario used GNP assumptions somewhat higher than the Higher Growth path defined here.) See Table 3 for all regional economic growth assumptions.

Table 3
Economic Growth Rate Assumptions
(annual percentage growth)

Higher Growth

Region	1985-2000	2000-2025	2025-2050	2050-2075	2075-2100
United States	3.0	2.5	2.0	1.5	1.0
Western Europe and Canada	3.0	2.5	2.0	1.5	1.0
Japan, Australia, New Zealand	3.5	2.5	2.0	1.5	1.0
USSR and Eastern Europe	4.6	4.1	3.1	2.6	2.1
Centrally Planned Asia	5.5	5.0	4.5	4.0	3.5
Middle East	4.1	4.6	3.6	3.1	2.6
Africa	4.5	4.0	3.5	3.0	2.5
Latin America	4.7	4.2	3.7	3.2	2.7
Rest of South and East Asia	5.3	4.8	4.3	3.8	3.3

Lower Growth

Region	1985-2000	2000-2025	2025-2050	2050-2075	2075-2100
United States	2.0	1.5	1.0	1.0	1.0
Western Europe and Canada	2.0	1.5	1.0	1.0	1.0
Japan, Australia, New Zealand	2.5	1.5	1.0	1.0	1.0
USSR and Eastern Europe	2.6	2.1	1.6	1.6	1.6
Centrally Planned Asia	3.5	3.0	2.5	2.5	2.5
Middle East	3.3	2.8	2.1	2.1	2.1
Africa	3.0	2.6	2.1	2.1	2.1
Latin America	2.7	2.2	1.7	1.7	1.7
Rest of South and East Asia	3.3	2.8	2.3	2.3	2.3

Source: Based on World Bank (1987)

Oil Prices

The oil prices were taken from *Annual Energy Outlook: 1989* published by the U.S. Department of Energy, Energy Information Administration (U.S. DOE, 1989), which supplies a range of oil price forecasts. The DOE Middle Price forecast was used in the Higher-Growth scenarios (by 2000 the world oil price is $28/barrel in 1988 dollars), while the Low Price forecast was used in the Lower-Growth scenarios (oil price by 2000 is $22/barrel in 1988 dollars). Since these price forecasts do not extend beyond 2000, the rate of price increase was derived from the SUPPLY model; in each case real prices escalated on average about 0.8% annually from 2000-2100, with escalation higher in the earlier years.

Energy Supply and Demand

Energy supply and demand estimates were based on recent U.S. DOE publications including *Annual Energy Outlook: 1989* (U.S. DOE, 1989), *Long Range Energy Projections to 2010* (U.S. DOE, 1988a, hereafter referred to as LREP), and *International Energy Outlook, 1987* (U.S. DOE, 1988b). These publications provide a range of international energy and economic projections, with annual GNP growth rates for the U.S. ranging from 2.3% to 3.3% and annual energy growth projections ranging from 1.0% to 1.7% (based on U.S. DOE Reference Case efficiency assumptions). Table 4 summarizes key results from these studies.

Table 4
Selected DOE Energy Projections
(annual percentage growth rates)

	AEO[a] Reference	LREP[b] High GNP	LREP Reference	LREP Low GNP	LREP High Efficiency.
GNP (US)	2.5	3.3	2.8	2.3	2.8
Primary Energy (US)	1.4	1.7	1.4	1.0	0.9
Electricity (US)	2.8	2.9	2.4	2.0	1.9
Energy Efficiency (US)	1.1	1.6	1.4	1.3	1.9
Primary Energy					
Other OECD	-	1.6	1.1	0.7	0.9
OPEC	-	3.1	2.5	2.0	2.3
Other Free World	-	3.5	3.0	2.6	2.8
US Consumption by Fuel					
Liquids	1.0	0.3	0.1	-0.1	-0.2
Natural Gas	1.6	0.5	0.3	0.2	-0.1
Coal	1.9	3.7	3.0	2.4	2.2
Other	1.6	3.2	2.8	2.5	2.5

[a] *Annual Energy Outlook; 1989*, U.S. DOE, 1989 (growth rates for the period 1988 to 2000)
[b] *Long Range Energy Projections to 2010*, U.S. DOE, 1988a (growth rates for the period 1986 to 2010)

In this analysis, energy supply and demand for the time period 1985 to 2010 were derived from growth and efficiency estimates that were relatively consistent with LREP (U.S. DOE, 1988a), but with some differences. Table 5 shows the LREP results (adjusted for the different economic growth assumptions), along with the actual values resulting from the scenarios presented in this analysis. The resulting patterns of energy demand and supply are consistent with recent historical trends in efficiency and carbon-based energy supply options. On the demand side, for example, global average energy efficiency improves by roughly 0.9% per year in Lower Growth scenarios, and about 1.3% in the Higher Growth scenarios in the Moderate Efficiency cases. On the supply side, the Carbon-Intensive cases assume that the costs of commercial solar electricity remains at current levels, (about $0.11/kwh in 1988 US dollars), the use of nuclear energy remains limited because of concerns over safety, and energy from commercial biomass remains low due to a combination of high development costs, lack of infrastructure, and competition with other uses for the land.

Table 5
Energy Growth and Efficiency Assumptions
Moderate Efficiency and Carbon-Intensive Scenarios
(annual percentage growth rate)

	Lower Growth Scenarios		Higher Growth Scenarios	
Region: U.S.	LREP[a]	This Study	LREP	This Study
GNP Growth	2.0%	2.0%	3.0%	3.0%
Primary Energy Growth	0.8%	0.7%	1.5%	1.2%
Electricity demand	1.9%	1.7%	2.7%	2.5%
Primary Energy Consumption by type				
Liquids	0.0%	0.0%	0.3%	0.3%
Natural Gas	0.2%	0.2%	0.5%	0.7%
Solids	2.2%	1.0%	3.5%	2.2%
Other (Nuclear, Renewables)	2.3%	1.6%	3.0%	2.1%
Energy Efficiency[b]				
U.S.	1.2%	1.2%	1.5%	1.7%
Other OECD	1.0%	1.2%	1.2%	1.5%
OPEC	1.1%	0.7%	1.0%	1.0%
Rest of Free World	0.7%	0.7%	0.8%	0.8%

[a] *Long Range Energy Projections to 2010*, U.S. DOE, 1988a.
[b] Annual improvements in energy intensity (reductions in primary energy use/$GDP).

Alternate Energy Efficiency Assumptions

In addition to the Moderate Efficiency assumptions, High Efficiency assumptions were formulated. The High Efficiency assumptions are somewhat more optimistic than those used in the LREP High Efficiency case (U.S. DOE, 1988a). For each region the aggregate energy efficiency improvement rate (annual percent decline in primary energy use/$GNP) was increased by about 1 percentage point in the Higher Growth scenarios and by about 0.5 percentage points in the Lower-Growth scenarios. For example, under the High Efficiency assumptions, global automobile fleet efficiencies average 50 mpg (4.7 liters/100 km) by 2025 and 100 mpg (2.4 liters/100 km) by 2100 in the Higher Growth Scenarios, and average 40 mpg (5.9 liters/100 km) by 2025 and 75 mpg (3.1 liters/100 km) by 2100 in the Lower Growth scenarios. (The

Alternative Accelerated Policies scenario employed higher efficiency assumptions than the High Efficiency assumptions described here, especially during the early periods.)

Alternate Energy Supply Assumptions

In addition to Carbon-Intensive energy supply assumptions, Gas-Intensive assumptions were formulated. In this case, carbon fees of 20-25% of delivered prices reduced the demand for oil and coal relative to natural gas, and research and development efforts were assumed to accelerate reductions in natural gas exploration and production costs on the order of 0.5% annually. These assumptions were intended to increase the projected annual growth in use of natural gas in the U.S. by 0.9 percentage points through 2010. Such growth would increase gas consumption from 17.3 trillion cubic feet (Tcf) in 1986 to 20.5 Tcf in 2010 in Lower Growth scenarios, and to 22.0 Tcf in 2010 with Higher Growth scenarios. These targets were not quite reached in the scenarios, although the market share of gas increased substantially, particularly in the electricity generation sector. Assumptions for the rest of the world were consistent with U.S. assumptions.

Two additional sets of assumptions featured high amounts of non-fossil energy. With the Non-Fossil-Intensive assumptions, the costs of commercial solar electricity fall to $0.06/kwh (1988 US dollars) after 2050. Similarly, because political and technological barriers to expanded nuclear energy are lifted the cost of nuclear generation falls to $0.055/kwh, and the costs of producing large quantities of biomass energy are significantly reduced. With these Non-Fossil-Intensive assumptions, the share of primary energy provided by non-fossil sources increases from 12% in 1985 to 19% in 2025 in the Lower Growth scenarios, and to 26% in the Higher Growth scenarios. By 2050, non-fossil sources contribute between 29% and 37% of global energy in the Lower Growth and Higher Growth scenarios, respectively, and between 69% and 79% by the year 2100.

With the Early Non-fossil Supply assumptions, non-fossil sources contribute nearly 80% of global primary energy by 2100 in both Higher and Lower Growth scenarios. In these scenarios, however, cost reductions for non-fossil sources occur by 2025, and carbon fees set at a level equivalent to $50/ton of coal are phased in during the first quarter of the next century. Consequently, non-fossil energy contributes substantially to energy supply during the middle of the century: by the year 2050, non-fossil energy accounts for over 70% of global energy requirements under both economic growth scenarios.

Combustion Control Technology Assumptions

Two sets of assumptions account for potential controls on carbon monoxide (CO) and nitrogen oxides (NO_x) from combustion of fossil fuels. With Modest Control assumptions, current emission controls are continued in the future. With Stringent Control assumptions, advanced emission control technologies are widely adopted. For mobile sources, Stringent Controls require that all gasoline powered vehicles use three-way catalysts by 2000, in OECD countries and by 2025 in the rest of the world. Stringent Control of stationary sources includes low-NO_x burner retrofitting on 85% of the conventional coal-fired boilers used to generate electricity in developed nations and on 40% of coal-fired utility boilers in developing nations, between 2000 and 2025. Beginning in 2000, Stringent Controls assume that all new electric utility and industrial boilers install selective catalytic reduction in developed countries and low-NO_x burners in developing nations; by 2025 selective catalytic reduction is mandatory for these sources in all countries. In addition, new industrial non-boiler combustors such as kilns and dryers require low-NO_x burners by 2000 under Stringent Controls.

Deforestation/Afforestation Assumptions

Net carbon flux projections due to deforestation and afforestation were calculated with a version of the Marine Biological Laboratory/Terrestrial Carbon Model. A low estimate for the amount of carbon stored in terrestrial ecosystems (forests and soils) was used, such that the net flux of carbon to the atmosphere for 1985 was about 0.7 petagrams (Pg).[3]

The following three sets of deforestation assumptions were used:

Case 1: Rapid Deforestation. The rate of deforestation is assumed to increase exponentially, based on population growth in each of the three tropical regions (Latin America, Africa, Asia), from 11 million hectares per year (ha/yr) in 1980 to 34 million ha/yr in about 2050, when the available area of forests in Asia is exhausted.[4] The rate of establishment of tree plantations in the tropics is assumed to be zero. These assumptions result in an increase in net carbon emissions from 0.7 Pg C/yr to more than 2 Pg C/yr in about 2050 before the Asian forests are exhausted. Latin American and African forests are exhausted by 2075, reducing emissions drastically. The total net release of carbon between 1980 and 2100 is about 140 Pg C.

Case 2: Moderate Deforestation. Tropical deforestation increases gradually, reaching 15 million ha/yr by about 2100. The rate of establishment of tree plantations in the tropics again is assumed to be zero. These assumptions result in emissions that total almost the same amount as in the previous assumptions, although they are spread out over a longer period. Annual emissions are close to 1 Pg C/yr from 2000 to 2100. The total net release of carbon between 1980 and 2100 is about 120 Pg C.

Case 3: Reforestation. Under the third set of assumptions, deforestation stops by 2025, while about 1000 million ha is reforested by 2100. (Only land that once supported forests and is not intensively cultivated is assumed to be available for reforestation.) The biosphere becomes a sink for carbon by 2000 and reaches its peak absorption of 0.7 Pg C/yr before 2025. The size of the sink gradually declines after 2025 as forests reach their maximum size and extent. This case results in a total net accumulation of carbon in forests of about 25 Pg.

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[3] 1 petagram = 10^{15} grams = 10^{9} metric tons = 1 gigaton (Gt).

[4] 1 hectare = 2.461 acres.

CFC and Halon Assumptions

Two sets of assumptions for CFC and halon production were based on the Montreal Protocol, while a third set included quick adoption of much stronger measures. In all cases, HCFCs remain uncontrolled, and .35 kilograms of HCFCs (using HCFC-22 as a proxy) are substituted for each kilogram of CFC reduction achieved. To determine the amount of CFC reduction that occurs under various control scenarios, we assume that underlying global demand for products and services that would use CFCs, if they were available, grows at an average annual rate of approximately 4.0% from 1986 to 2000 and at a 2.5% rate from 2000 to 2050; demand remains constant thereafter. Growth in demand is much higher in certain developing countries, particularly India and China. The three sets of assumptions are as follows:

Case 1: Protocol/Low Compliance. The Montreal Protocol is assumed to come into force and apply throughout the projection period. As currently formulated, this agreement calls on developed countries to reduce their emissions of certain CFCs by 50% (from 1986 levels) by 1998, and to freeze the use of halons at 1986 levels by 1992. Developing countries with low per capita consumption, however, are allowed to increase the use of these compounds for up to 10 years. In addition to all of the developed countries, we assume that 85% of developing countries (on the basis of current CFC consumption) participate in the agreement. The increasing demands for CFC uses do not translate directly to consumption or production in developing countries, however, because it is assumed that shifts in technology development away from CFCs in the participating countries "rechannels" demand in other countries as well. Rechanneling refers to technological diffusion of non-CFC-using applications in developing countries, either because non-CFC products are superior to CFC products or because trade opportunities (with participating nations) for producers of CFCs and manufacturers of CFC-using equipment are curtailed. This rechanneling reduces the baseline growth rates in non-participating countries by roughly 75%.

Case 2: Protocol/Full Compliance. All countries agree to conform to the Montreal Protocol, which, however, still allows selected developing countries to increase consumption initially while most nations curtail consumption over the next decade.

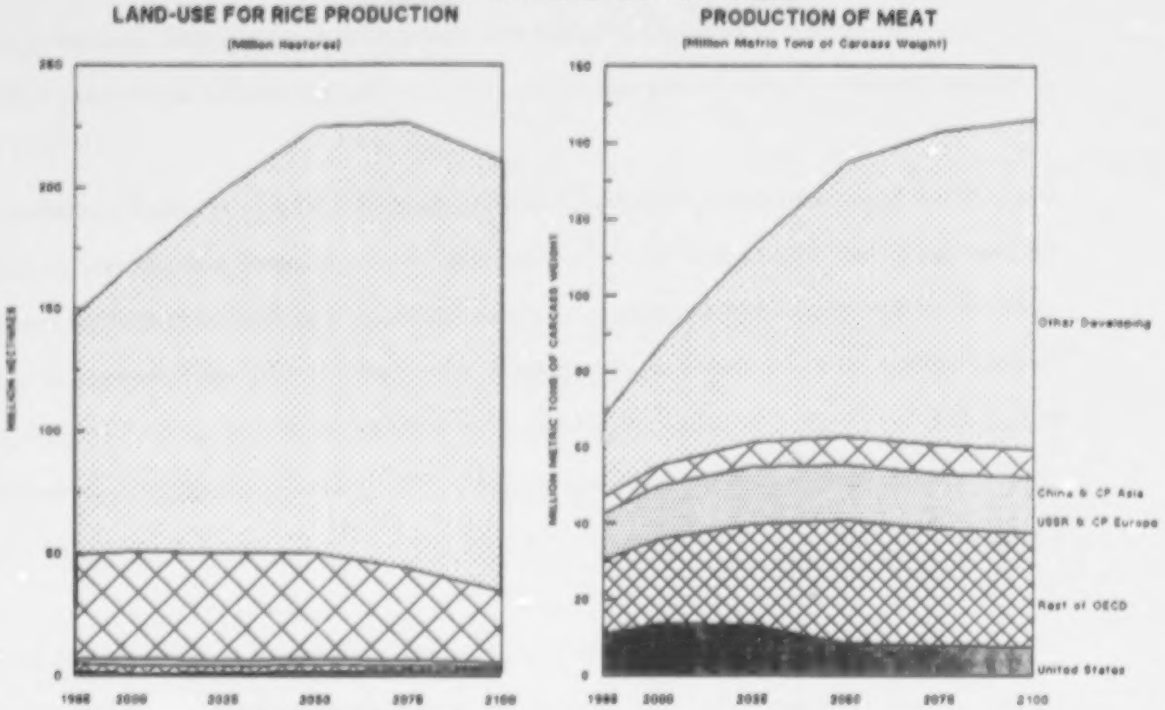
Case 3: Phase out. The Montreal Protocol is strengthened to produce a complete phase-out of CFC and Halon production by the year 2000, with 100% of countries participating. In addition to the CFC and Halon phase-out, the production of carbon tetrachloride (CCl_4) and methyl chloroform (CH_3CCl_3) is capped by 1990.

Agricultural Assumptions

Agricultural assumptions fall into two main categories: levels of agricultural activities and emission coefficients. All scenarios share identical assumptions regarding the levels of activity for the major agricultural activities affecting trace-gas emissions, shown in Figure 3. The land area used for rice production increases by nearly 45% from 1985 to 2100. Meat production increases more, about 120%, as demand rises because of increasing population and income. Dairy production increases by 135% between 1985 and 2100. Satisfying the demands of increasing populations with a finite amount of land requires more intensive cultivation, resulting in a 160% increase in fertilizer use between 1985 and 2100.

Figure 3

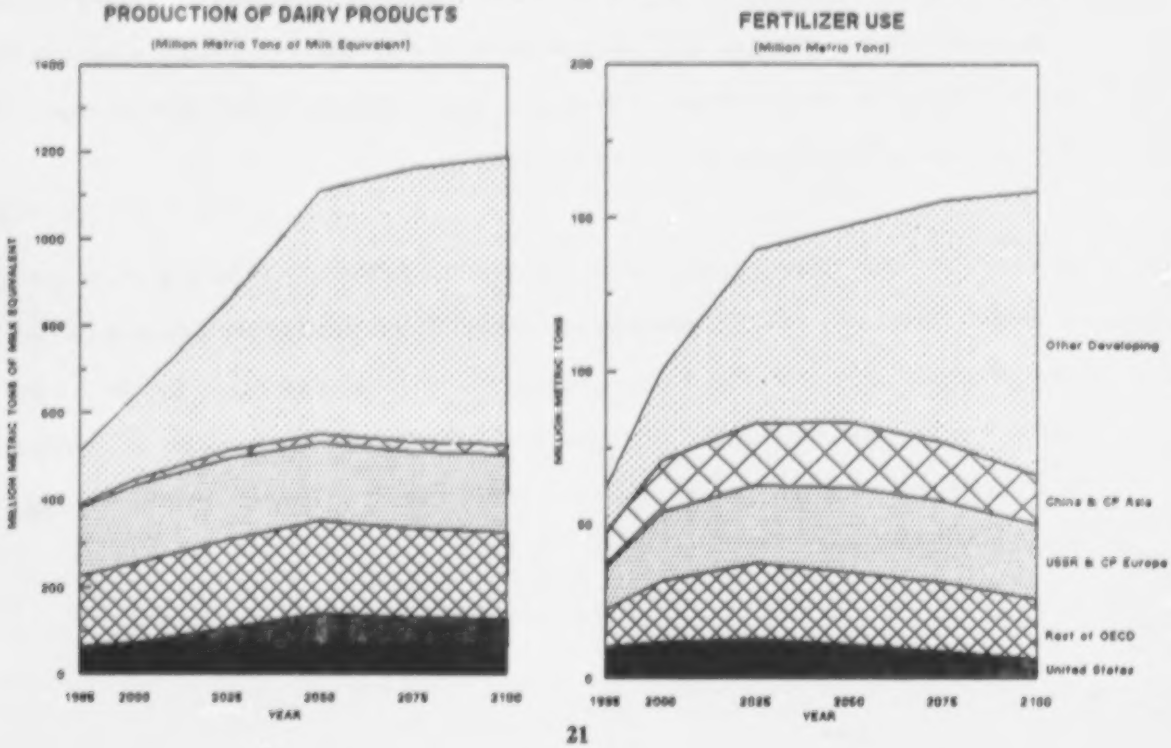
AGRICULTURAL ACTIVITIES


LAND-USE FOR RICE PRODUCTION

(Million Hectares)

PRODUCTION OF MEAT

(Million Metric Tons of Carcass Weight)


PRODUCTION OF DAIRY PRODUCTS

(Million Metric Tons of Milk Equivalent)

FERTILIZER USE

(Million Metric Tons)

However, two sets of emission coefficients were formulated to bracket possible scenarios of future agricultural emissions: Current Factors and Declining Factors. The key variables are discussed below.

Enteric Fermentation. Methane emissions from domestic animals are a function of animal populations and emissions per animal. With Current Factors, methane emissions grow at the same rate as herd size, which more than doubles between 1985 and 2050, and grows another 7% between 2050 and 2100. With Declining Factors, emissions grow at half the rate of herd size between 1985 and 2050, and then gradually decline between 2050 and 2100, due to productivity increases, changes in meat and dairy production techniques, such as the use of additives like methane-inhibiting ionophores, diet changes, or alterations in animal waste management methods.

Rice Production. Total rice production is likely to grow at close to the rate of population growth in Asia and not vary with economic growth rates. However, methane emissions from rice are probably primarily a function of total area under cultivation, which might only grow by about 0.4% annually, rather than total yield. With Current Factors, methane emissions grow at the same rate as total harvested area. With Declining Factors, emissions per hectare decrease by 0.5%/yr.

Fertilizer Use. Global nitrogenous fertilizer use may grow on the order of 0.8%/yr, with similar increases in fertilizer-derived N_2O emissions expected under Current Factors assumptions. Emissions per unit of nitrogen applied decrease by 0.5%/yr when Declining Factors are assumed, due to changes in types of fertilizers and method of application. (It is possible that policies could also encourage the development of fertilizers that would alter the total quantity of fertilizer required; however, this possibility was not modeled in this analysis.)

Summary of Assumptions by Scenario

Using the sets of assumptions outlined above, two alternative detailed scenarios (a Higher Growth and a Lower Growth scenario) were developed for each of the four emission profiles established by the RSWG, resulting in a total of eight sets of model results. Table 6 outlines the assumptions used in building each of the eight detailed scenarios. Since some purposes may be best served by providing only one set of results for each of the four emission profiles, we have also presented emissions and atmospheric concentrations for four Average scenarios, which are simply an average of the results of the Higher and Lower Growth scenarios.

Table 6

SCENARIO ASSUMPTIONS

	2030 High Emissions		2060 Low Emissions		Control Policies		Accelerated Policies	
	Higher Growth	Lower Growth	Higher Growth	Lower Growth	Higher Growth	Lower Growth	Higher Growth	Lower Growth
Population[a]	World Bank	World Bank	World Bank	World Bank	World Bank	World Bank	World Bank	World Bank
GNP[b]	Higher	Lower	Higher	Lower	Higher	Lower	Higher	Lower
Energy Supply[c]	Carbon Intensive	Carbon Intensive	Gas Intensive	Gas Intensive	Non-Fossil Intensive	Non-Fossil Intensive	Early Non-Fossil Supplies	Early Non-Fossil Supplies
Energy Demand[d]	Moderate Efficiency	Moderate Efficiency	High Efficiency	High Efficiency	High Efficiency	High Efficiency	High Efficiency	High Efficiency
Control Technology[e]	Modest Controls	Modest Controls	Stringent Controls	Stringent Controls	Stringent Controls	Stringent Controls	Stringent Controls	Stringent Controls
CFCs[f]	Protocol/ Low Compliance	Protocol/ Low Compliance	Protocol/ Full Compliance	Protocol Full Compliance	Phase-Out	Phase-Out	Phase Out	Phase Out
Deforestation[g]	Moderate	Rapid	Reforest	Reforest	Reforest	Reforest	Reforest	Reforest
Agriculture[h]	Current Factors	Current Factors	Current Factors	Current Factors	Declining Factors	Declining Factors	Declining Factors	Declining Factors

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[a] Population estimates, taken from the World Bank (Zachariah and Vu, 1988) were not varied between scenarios. Global population reaches 9.5 billion in 2050 and 10.4 billion in 2100. In developing countries, population growth rates decline markedly after 2000, achieving a net reproduction rate of unity in every country by 2040.

[b] GNP growth rates were based on estimates from the World Bank (1987). For the Higher Growth cases, the average annual rate of GNP growth for the world decreases from 3.6% per year for the period 1985-2000, to about 3.3% per year for the period 2000-2025, to about 2.6% per year for the period 2025-2100. For the Lower Growth cases, the average annual rate of GNP growth for the world decreases from about 2.2% per year for the period 1985-2000, to about 2.1% per year for the period 2000-2025, to about 1.3% per year for the period 2025-2100. In the Higher Growth rate cases, oil prices were assumed to reach $28/barrel (in 1988 US dollars) by 2000, but reach only $22/barrel in 2000 in Lower-Growth cases; after 2000, oil prices rise by an average of 0.8% in both cases.

Table 6 (continued)
SCENARIO ASSUMPTIONS

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[c] For the Carbon-Intensive cases, energy supply is dominated by fossil-fuel technologies. For the Gas-Intensive cases, fossil fuels continue to play a major role, but the natural gas share of the energy supply market is increased. For the Non-Fossil-Intensive cases, non-fossil technologies become economic in the latter part of the next century and supply most primary energy needs after 2075. For the Early Non-Fossil cases, non-fossil technologies play a much larger role starting in the early part of the next century.

[d] In the Moderate Efficiency cases, the annual rate of improvement in energy intensity (or primary energy use per dollar of GNP) decreases from an initial value between 1.0 and 1.5% to an average value for the years 2075 to 2100 between 0.7 and 1.2%. The average annual rate of improvement in energy intensity for the years 1985 to 2100 ranges between 0.8 and 1.3%. In the High Efficiency cases, the annual rate of improvement in energy intensity decreases from an initial value between 1.5 and 2.5% to an average value for the years 2075 to 2100 of between 1.1 and 1.8%. The average annual rate of improvement in energy intensity for the years 1985 to 2100 ranges between 1.2 and 1.9%.

[e] In the Moderate Controls cases, current emission control technologies are assumed. In the Stringent Controls cases, the following controls are assumed: more stringent NO_x and CO controls on mobile and stationary sources, including all gas vehicles using three-way catalysts, in OECD countries by 2000 and in the rest of the world by 2025; from 2000 to 2025 conventional coal burners used for electricity generation are retrofit with low NO_x burners, with 85% retrofit in the developed countries and 40% in developing countries; starting in 2000 all new combustors used for electricity generation and all new industrial boilers require selective catalytic reduction in the developed countries, and low NO_x burners in the developing countries and after 2025 all new combustors of these types require selective catalytic reduction; other new industrial non-boiler combustors such as kilns and dryers require low NO_x burners after 2000.

[f] In the Protocol/Low Compliance cases, the Montreal Protocol is assumed to come into force and apply through 2100, with 100% participation by the U.S. and developed countries and 85% participating developing countries. The assumptions are the same in the Protocol/Full Compliance case except that all countries participate. In the Phase-Out cases, CFCs are completely phased out by 2000 and production of CCl_4 and CH_3CCl_3 are frozen with 100% participation.

[g] Tropical deforestation increases gradually in the Moderate cases, from 11 million ha/yr in 1985 to 15 million ha/yr by about 2100. Tropical deforestation increases exponentially in the Rapid cases, reaching 34 million ha/yr in about 2050, with almost complete tropical forest deforestation by about 2075. In the Reforest cases, deforestation stops by 2025, while about 1,000 million ha are reforested by 2100.

[h] Levels of activity for the major agricultural activities were not varied among scenarios, since population levels were not varied. Emission factors, however, were changed among scenarios. Current estimates of average emission factors were used in the Current Factors cases, while reduced factors (assuming technological and management improvements) were used in the Declining Factors cases.

RESULTS

We have used the ASF to estimate the implications of the scenarios described above for emissions of radiatively important gases arising from energy production and use, industrial processes, changes in land use, and agricultural activities. Figures 4 through 7 display results for all 13 scenarios, including the alternative stabilization scenario. For 12 scenarios the atmospheric concentrations of these trace gases reach the level of equivalent doubling of CO_2 in the years shown on Table 7 (based on linear interpolation and 580 ppm as doubling).

Table 7

Year that Equivalent Doubling of CO_2 Will Occur Under Twelve Scenarios

	SCENARIO			
Economic Growth Assumption	2030 High Emissions	2060 Low Emissions	Control Policies*	Accelerated Policies*
Lower Growth	2034	2073	>2100	>2100
Average	2030	2059	>2100	>2100
Higher Growth	2028	2051	2100	>2100

* In the Control Policies scenarios, atmospheric trace-gas concentrations do not reach $2xCO_2$ by 2100, but they come close to that level and then flatten out as shown in Figure 6. As Figure 7 shows, emissions remain substantially below $2xCO_2$ during the next century under all of the Accelerated Policies scenarios.

Figure 4

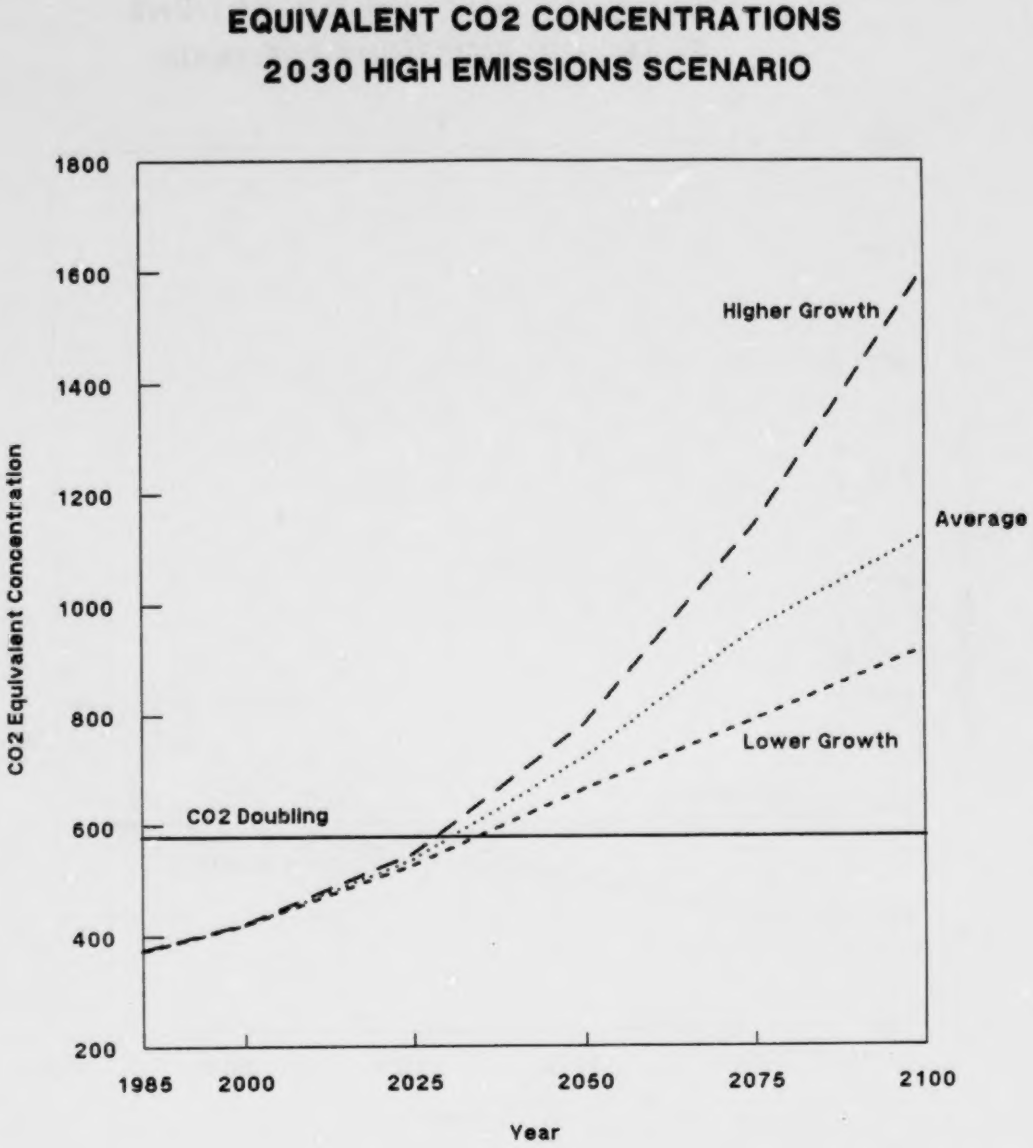

EQUIVALENT CO2 CONCENTRATIONS
2030 HIGH EMISSIONS SCENARIO
1800
1600
1400
1200
1000
800
600
400
200
CO2 Equivalent Concentration
Higher Growth
Average
Lower Growth
CO2 Doubling
1985
2000
2025
2050
2075
2100
Year

Figure 5

EQUIVALENT CO2 CONCENTRATIONS
2060 LOW EMISSIONS SCENARIO

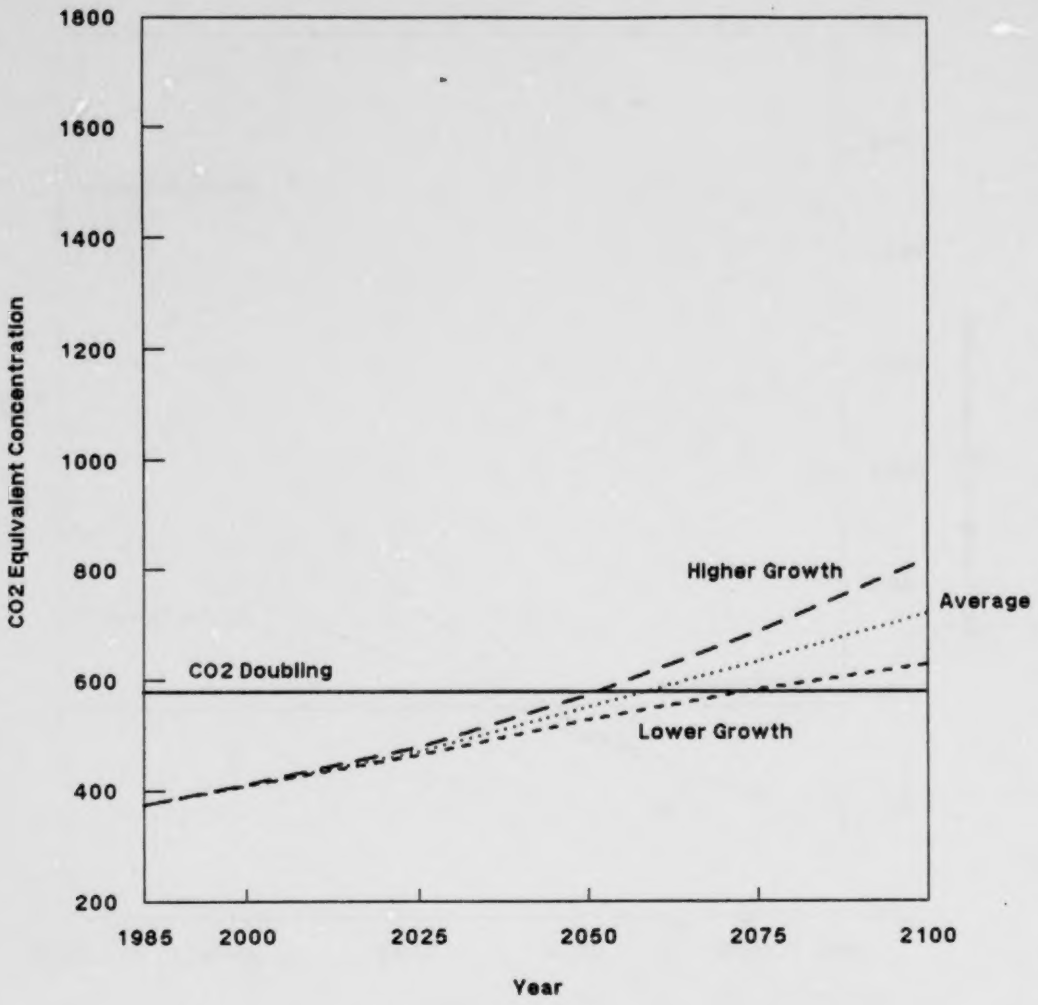


Figure 6

EQUIVALENT CO2 CONCENTRATIONS
CONTROL POLICIES SCENARIO

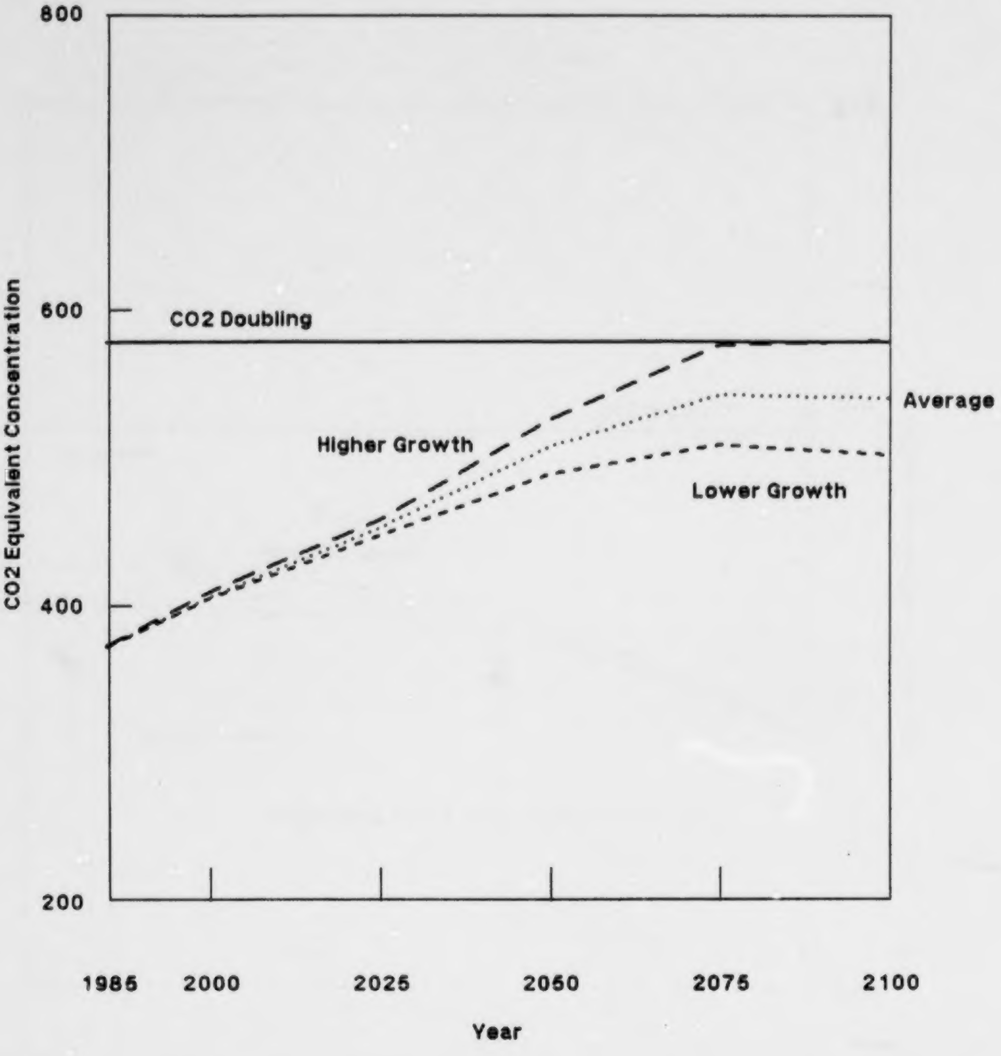
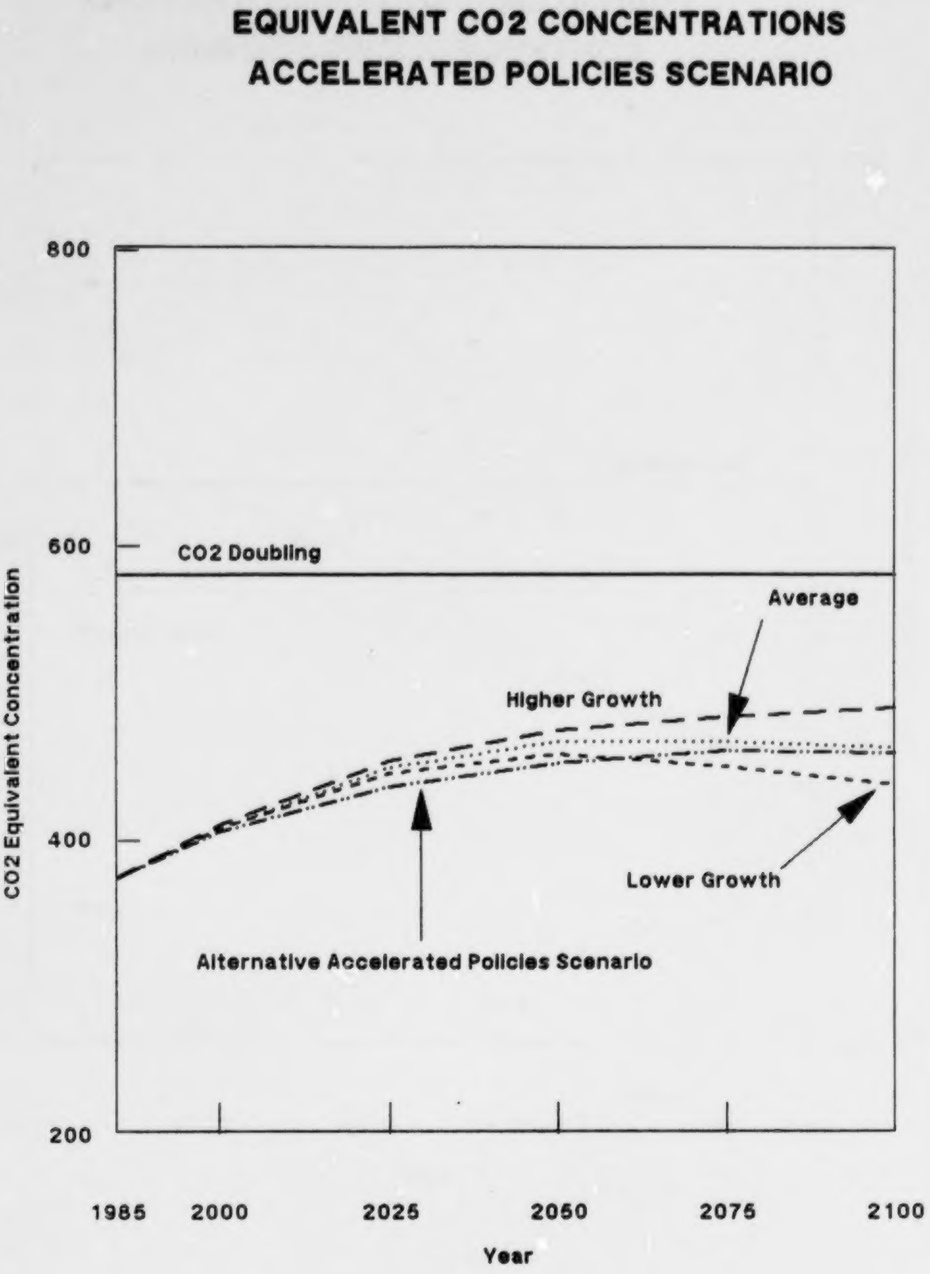


Figure 7



EQUIVALENT CO2 CONCENTRATIONS
ACCELERATED POLICIES SCENARIO
800
600
400
200
CO2 Doubling
Average
Higher Growth
Lower Growth
Alternative Accelerated Policies Scenario
CO2 Equivalent Concentration
1985
2000
2025
2050
2075
2100
Year

Energy Sector

The two most important determinants of greenhouse gas emissions are the level of energy demand and the combination of sources that are used to supply that energy. Figures 8 through 11 display two components of total global end-use energy demand -- fuel and electricity -- for the scenarios, by region. In the 2030 High Emissions scenario, total end-use energy demand increases from about 215 exajoules (EJ, or 10^{18} joules) in 1985 to 335 EJ in 2025 in the Lower Growth scenario versus 440 EJ when Higher Growth is assumed.[5] Greater improvements in energy efficiency in the 2060 Low Emissions and Control Policies scenarios reduce end-use demand in 2025 to about 270 EJ under Lower Growth assumptions, while in both Higher Growth scenarios, end-use demand is about 310 EJ by 2025. By 2100 end-use demand in the 2030 High Emissions scenarios reaches 445 EJ in the Lower Growth scenario and twice that level, 890 EJ, in the Higher Growth scenario. Differences between end-use energy demand is primarily a function of the economic growth assumptions under the remaining scenarios. For the 2060 Low Emissions, Control Policies and Accelerated Policies scenarios, end-use energy demands in 2100 are 275 EJ, 240 EJ, and 300 EJ, respectively, under Lower Growth assumptions; in the Higher Growth scenarios, end-use demand is 460 EJ, 420 EJ, and 445 EJ, respectively.

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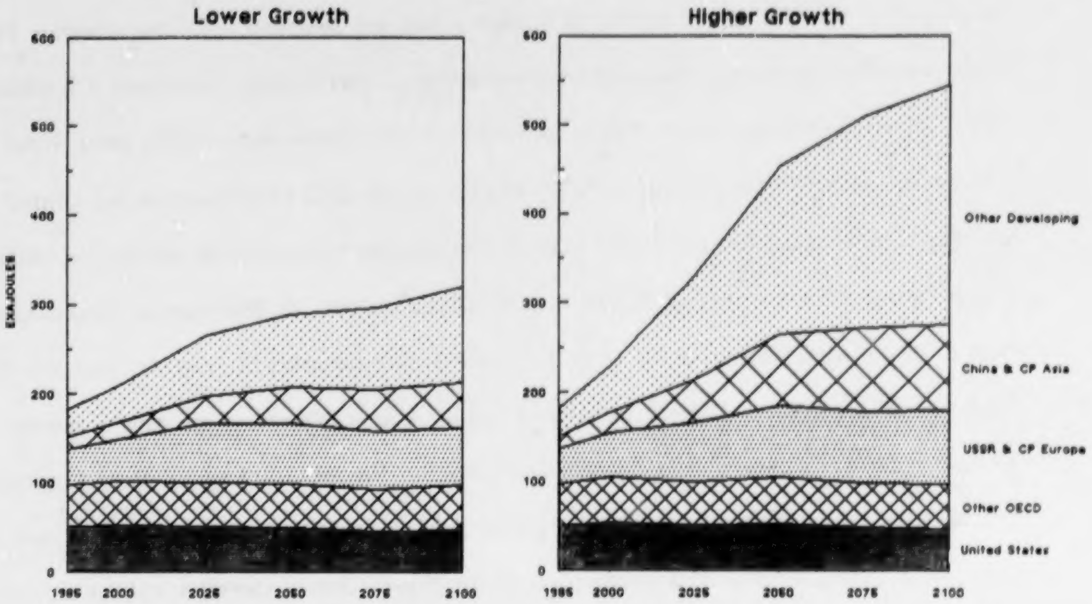
[5] 1 EJ = 0.948 quadrillion Btu (Quad).

Figure 8

END-USE ENERGY DEMAND BY REGION: 2030 HIGH EMISSIONS SCENARIO

End-Use Fuel Demand



End-Use Electricity Demand

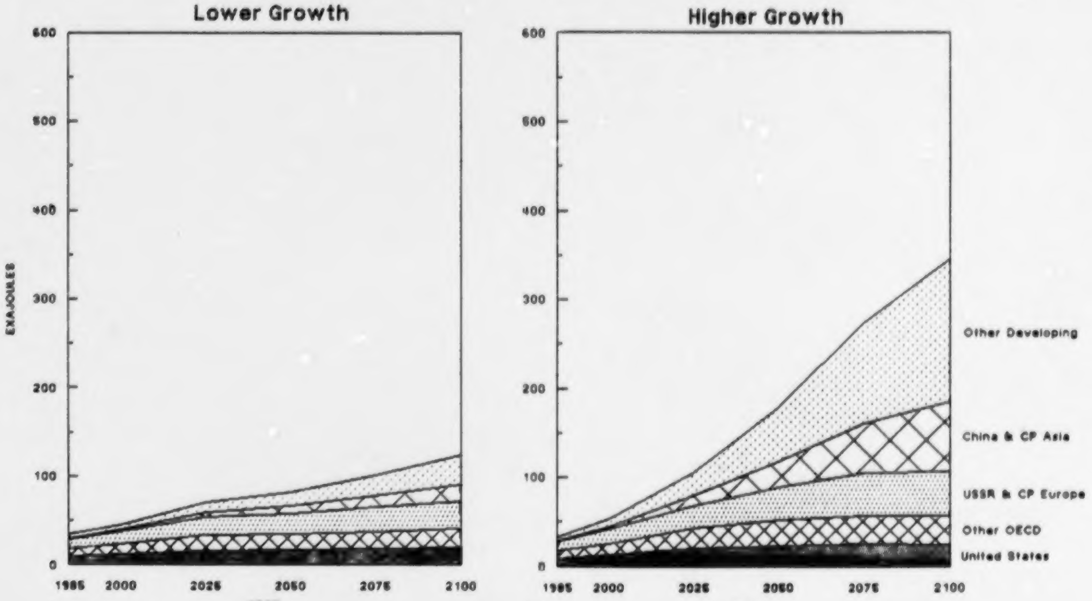
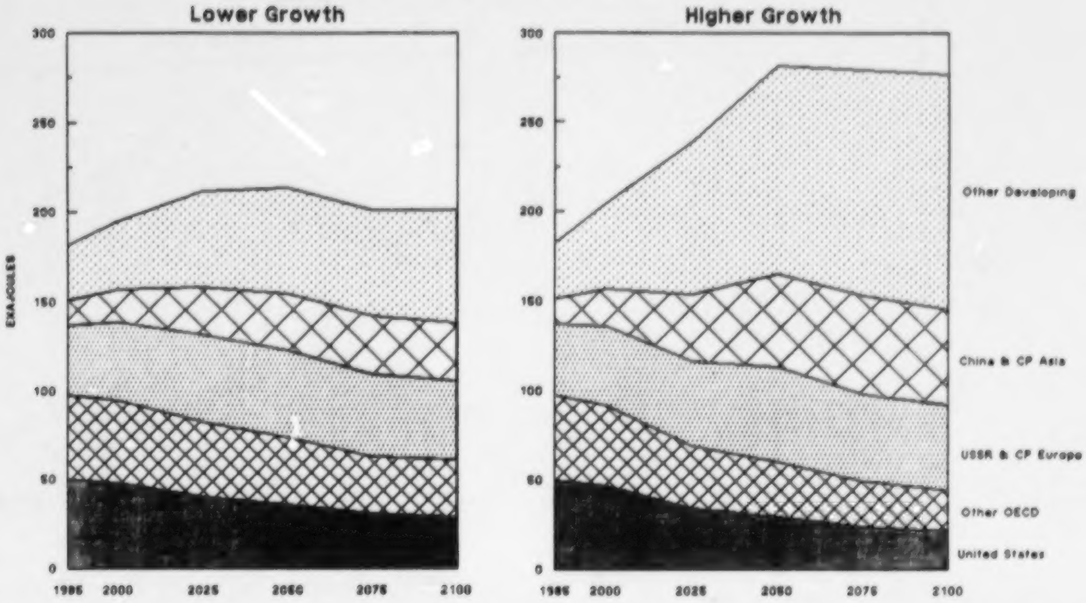


Figure 9

END-USE ENERGY DEMAND BY REGION: 2060 LOW EMISSIONS SCENARIO

End-Use Fuel Demand



End-Use Electricity Demand

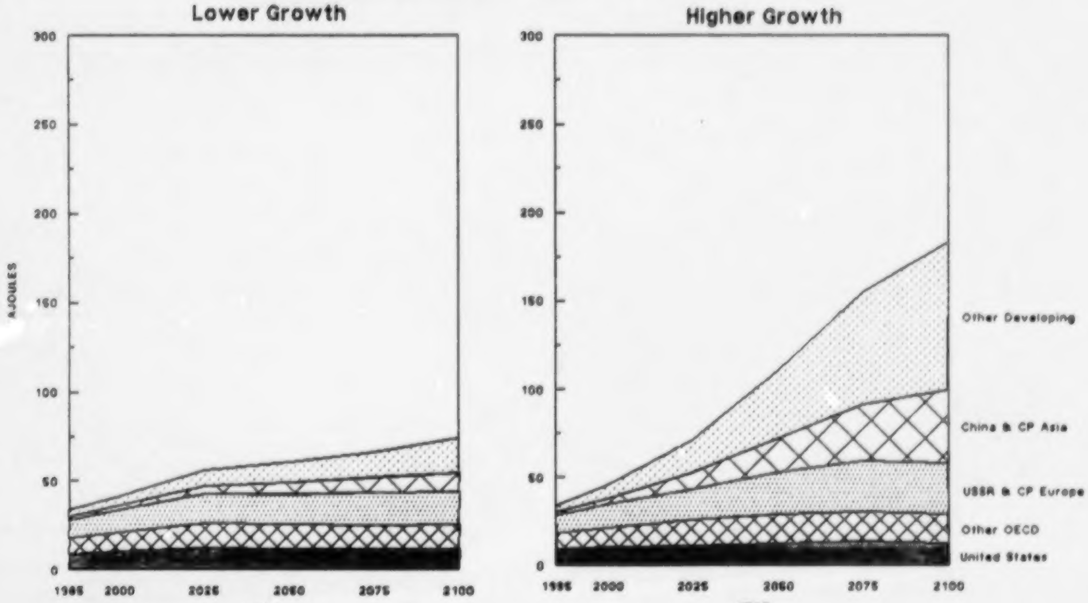
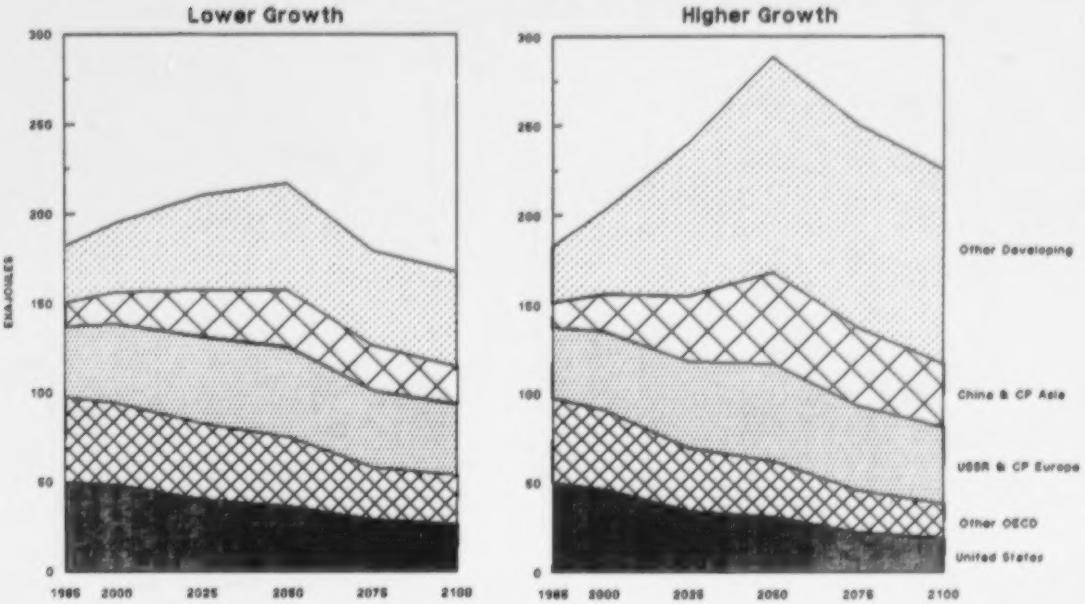


Figure 10

END-USE ENERGY DEMAND BY REGION: CONTROL POLICIES SCENARIO

End-Use Fuel Demand



End-Use Electricity Demand

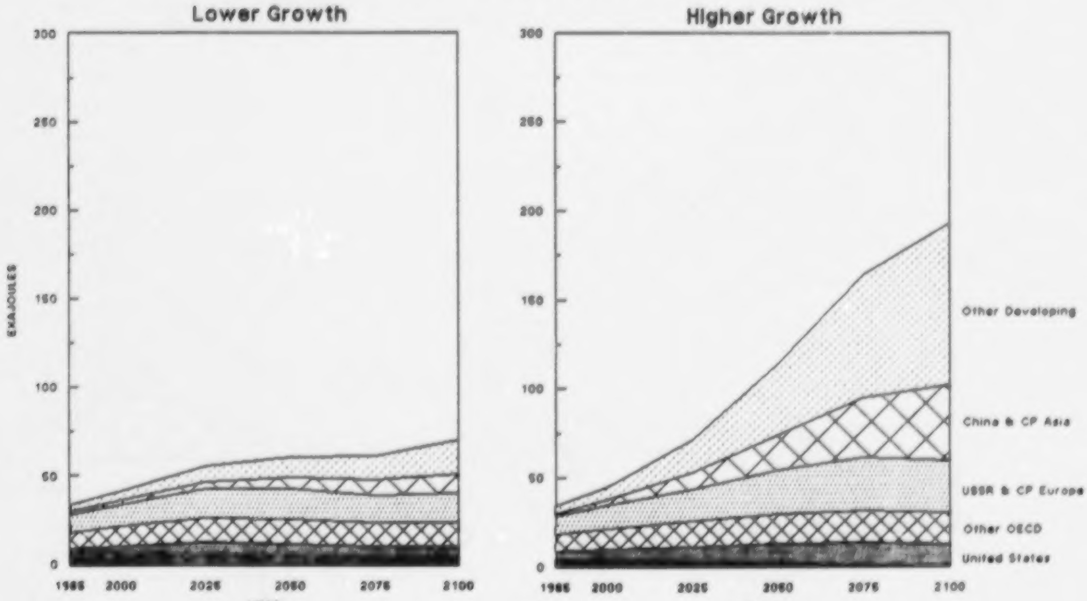
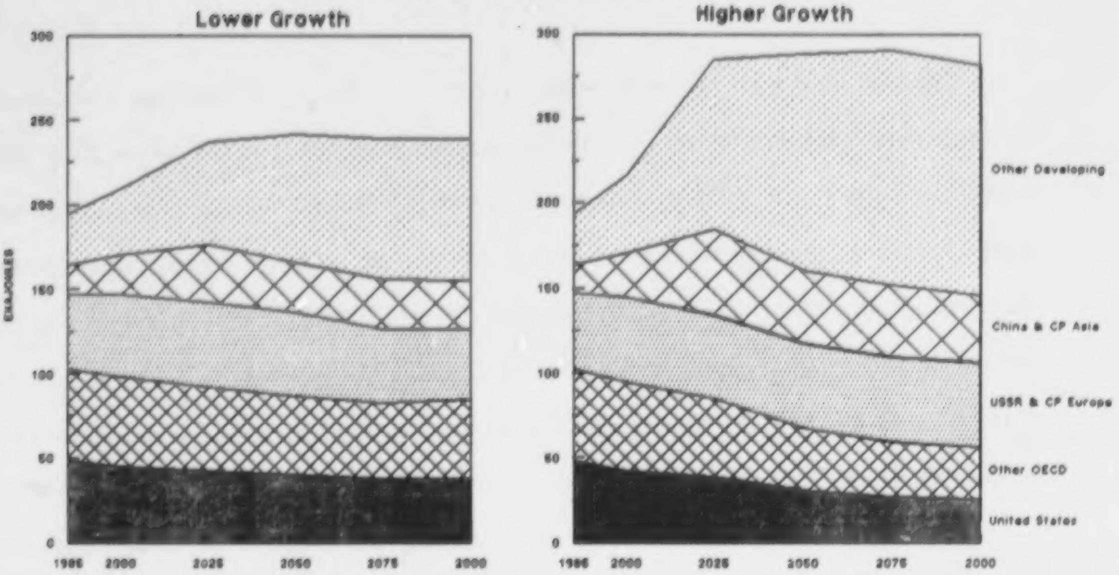


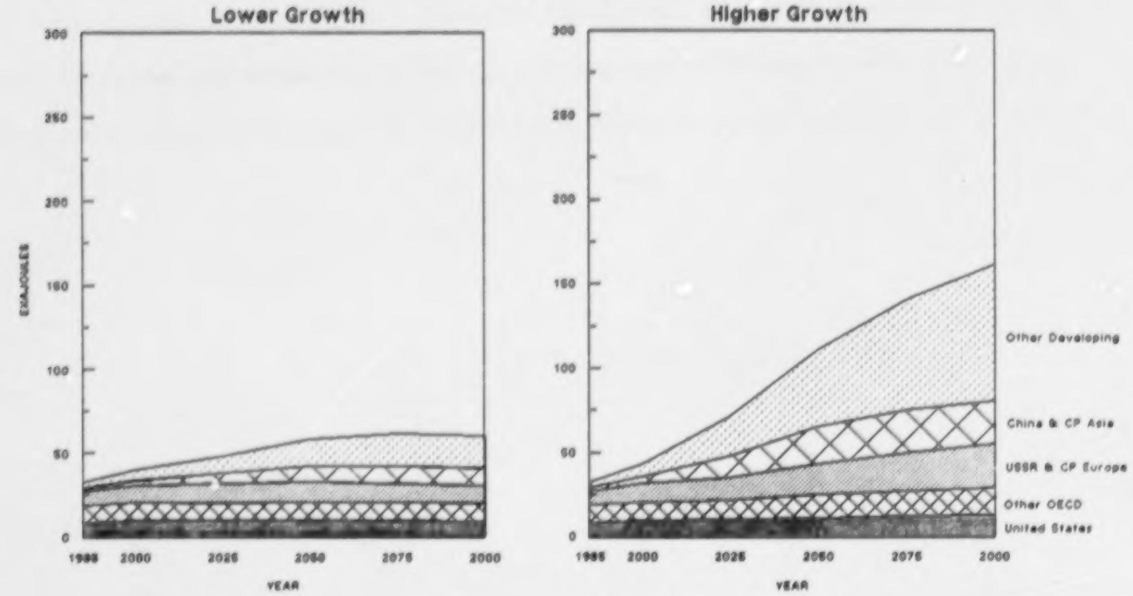
Figure 11

END-USE ENERGY DEMAND BY REGION: ACCELERATED POLICIES SCENARIO

End-Use Fuel Demand



End-Use Electricity Demand



The basic differences between the eight Higher Growth/Lower Growth detailed scenarios in total primary energy supply by type are shown in Figure 12 (Higher Growth) and Figure 13 (Lower Growth). Growth in primary energy supply is substantially higher than growth in end-use energy demand because of increased requirements for electricity and synthetic fuel production.

These increased requirements for primary energy are greatest in the 2030 High Emissions/Higher Growth scenario, where primary energy production increases from 290 EJ in 1985 to 660 EJ in 2025 and to 1680 EJ in 2100, a 130% and a 480% increase, respectively, compared with a 105% and a 315% increase in end-use demand. In the corresponding Lower Growth scenario, primary energy production increases to 730 EJ by 2100, an increase of about 150% relative to 1985. In the 2060 Low Emissions scenario, primary energy production by 2100 increases to 430 EJ under Lower Growth assumptions (a 50% increase relative to 1985) and to 850 EJ when Higher Growth is assumed (a 195% increase). In the Control Policies scenario, primary energy production by 2100 increases to about 395 EJ (a 35% increase) under Lower Growth assumptions and to nearly 840 EJ (a 190% increase) in the Higher Growth scenario. Primary energy supply in the Accelerated Policies scenario remains slightly below that in the Control Policies scenario, at all time intervals, when Lower Growth is assumed. However, the swift expansion of non-fossil energy sources in the Accelerated Policies/Higher Growth scenarios yields slightly more total primary energy supply in 2050 than is the case in the Control Policies/Higher Growth scenario, but slightly less in other years.

Figure 12

GLOBAL PRIMARY ENERGY SUPPLY BY TYPE: Higher Growth

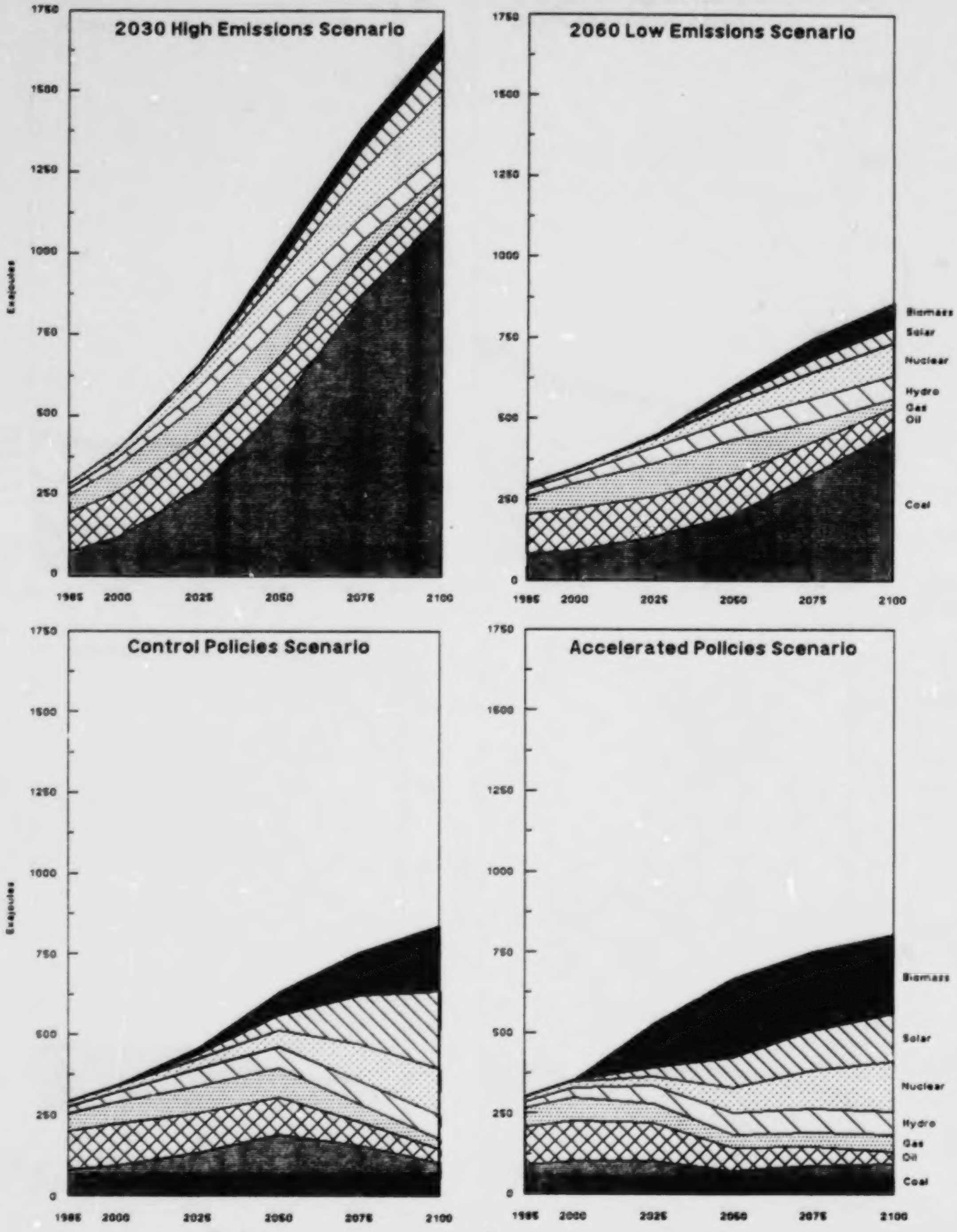
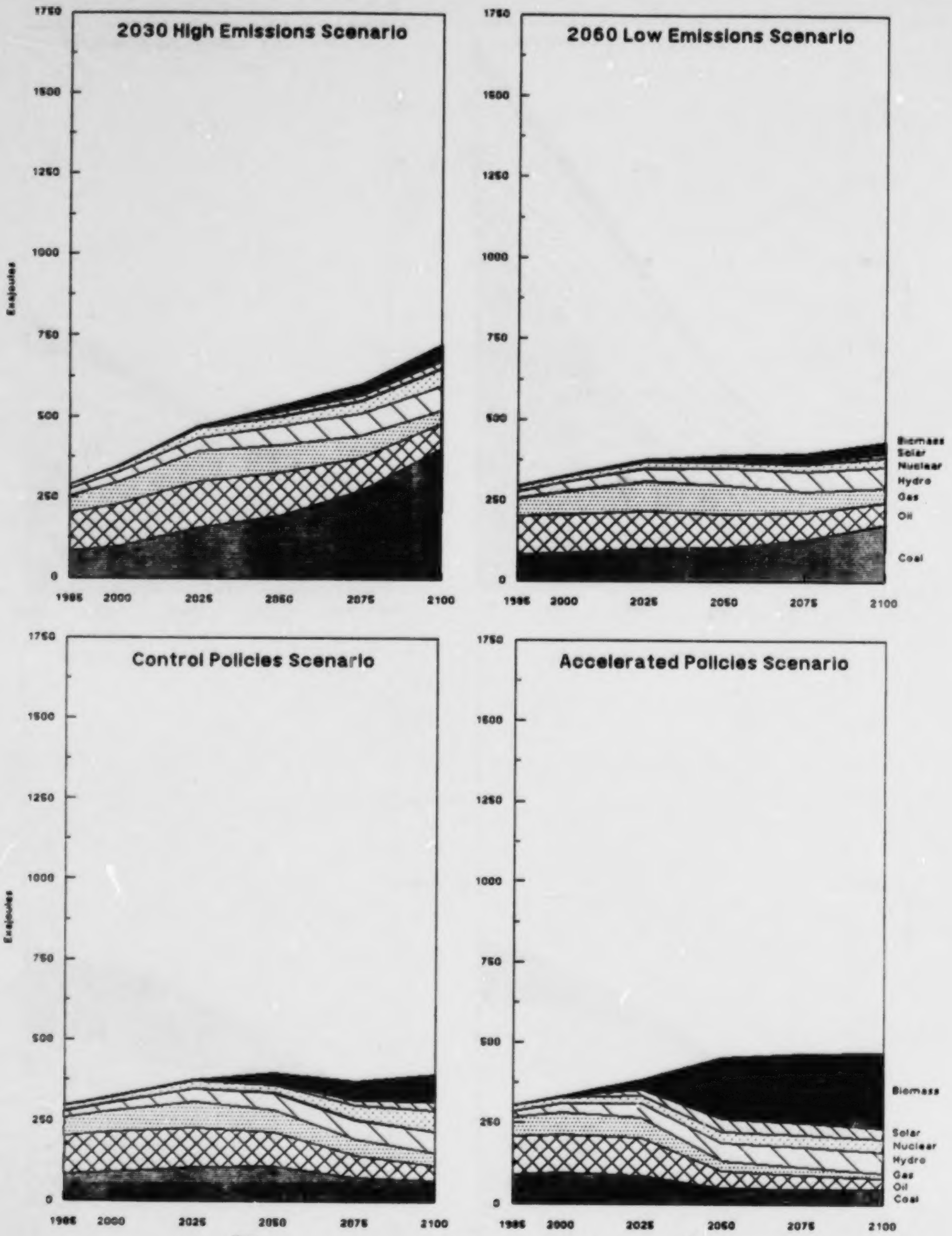


Figure 13

GLOBAL PRIMARY ENERGY SUPPLY BY TYPE: Lower Growth



The mix of primary energy resources used to generate electricity is also crucial in determining future greenhouse gas emissions. While non-fossil energy sources (nuclear, solar, and hydro) increase their absolute contribution to primary energy supply in all scenarios, the rate of growth varies considerably among the scenarios. Thus, in the 2030 High Emissions/Higher Growth scenario, demand for electricity and synthetic fuel production pushes global coal consumption up by more than a factor of 14 between 1985 and 2100. Correspondingly, the share of primary energy supplied by coal increases from 27% in 1985 to 42% in 2025 to 67% in 2100. The same forces are at work in the 2030 High Emissions/Lower Growth scenario, but the results are less dramatic: coal production increases by less than a factor of 5, and its share of primary energy reaches just over 55% by 2100. In the 2060 Low Emissions scenarios, coal production increases by a factor of almost 6 between 1985 and 2100 (for a market share of about 54%) under Higher Growth assumptions, while in the corresponding Lower Growth case coal production increases only about 120% by 2100 (for a 41% market share). In the Control Policies/Lower Growth scenario, coal increases about 35% above 1985 levels by 2050, then declines to about 20% below 1985 levels in 2100, by which time non-fossil energy sources capture a 62% market share. In the Control Policies/Higher Growth scenario, coal production increases by 135% by 2050, and then declines to a level in 2100 that is only 30% greater than that in 1985 (coal's market share by 2100 is about 12%). During this time, biomass, solar and nuclear energy production increase markedly: between 1985 and 2100, the total non-fossil share of primary energy supply increases from about 12% to 37% between 1985 and 2050, and reaches nearly 80% in 2100, when non-fossil sources provide over 660 EJ of energy. Non-fossil energy sources play an even more substantial role in the Accelerated Policies scenarios: in both detailed scenarios, non-fossil energy sources provide over 70% of primary energy requirements by the year 2050, reaching roughly 80% by 2100.

Deforestation and Reforestation

Because the causes of deforestation are complex and vary from country to country, it is difficult to directly tie assumptions about deforestation rates to other elements in the scenarios. Qualitatively, we assume that in the Rapid deforestation case (used in the 2030 High Emissions/Lower Growth scenario), poverty, unsustainable agricultural practices, and population pressures lead to increasing deforestation. The rate of deforestation is assumed to increase from current levels at the rate of population growth, and tropical deforestation increases from 11 million hectares per year (Mha/yr) in 1980 to 34 Mha/yr in 2047, when all the unprotected forests in Asia are exhausted. In the Moderate deforestation case (used in the 2030 High Emissions/Higher Growth scenario), improved agricultural practices and the substitution of modern fuels for traditional uses of wood could ease the pressure on forests. Nonetheless, clearing of forest lands for agriculture, pasture, logging, and speculation could continue apace, even if small areas are set aside as biological preserves. In this case, tropical deforestation is assumed to increase very gradually, reaching 15 Mha/yr in 2097, before the unprotected forest areas of Latin America are exhausted.

In the Reforestation case (used in the remainder of the scenarios), it is assumed that a combination of policies succeed in stopping deforestation by 2025, while more than 1000 Mha is reforested by 2100. Only land that once supported forests and is not intensively cultivated is assumed to be available for reforestation. These lands include 85% of the area currently involved in shifting cultivation (370 Mha), under the assumption that this practice is replaced by sustainable low-input agriculture (Sanchez and Benites, 1987). In addition, fallow agricultural land in the temperate zone (250 Mha), planted pasture in Latin America (100 Mha), and degraded land in Africa and Asia (400 Mha) are assumed to be reforested. Of the reforested land, about 380 Mha is assumed to be in plantations; the rest absorbs carbon at a much lower rate but reaches a higher level of average biomass.[6]

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[6] Plantation products decay at various rates at the end of each rotation; no attempt to protect this carbon from oxidation is assumed.

The carbon fluxes associated with these deforestation/reforestation scenarios are shown in Figure 13. In the Rapid deforestation scenario, CO_2 emissions increase rapidly from 0.7 Pg C/yr to more than 2 Pg C/yr in 2047 before the Asian forests are exhausted. Latin American and African forests are exhausted by 2075, reducing emissions drastically. Total deforestation emissions are almost the same in the Moderate deforestation case, but in the Moderate deforestation case they are spread out over a longer period: close to 1 Pg C/yr from 2000 to 2100. In the Reforestation scenario, the biosphere becomes a sink for carbon by 2000 and reaches its peak absorption of 0.7 Pg C/yr before 2025. The size of this sink declines gradually after 2025 as forests reach their maximum size and extent.

Greenhouse Gas Emissions

Table 8 lists total annual emissions of important trace gases for the eight Higher Growth and Lower Growth scenarios, plus CO_2 emissions for the alternative stabilization scenario, for the years 1985, 2000, 2025, 2050, 2075, and 2100; Table 9 shows four Average cases. Total emissions of CO_2 and CH_4, by source, are shown in Figures 15, 16, 17, and 18 while emissions of the major CFCs are shown in Figure 19.

Figure 13

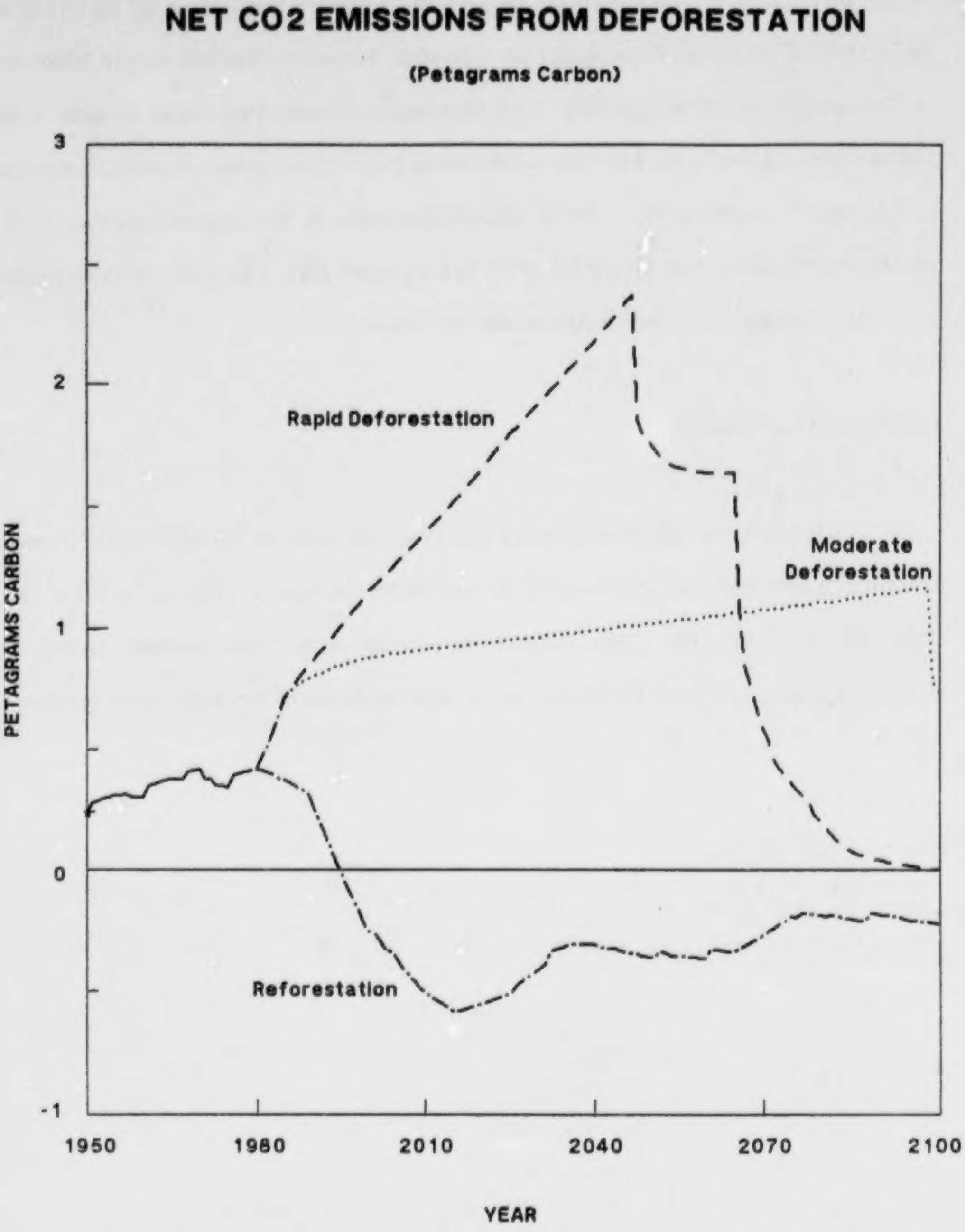

NET CO2 EMISSIONS FROM DEFORESTATION
(Petagrams Carbon)
PETAGRAMS CARBON
3
2
1
0
-1
1950
1980
2010
2040
2070
2100
YEAR
Rapid Deforestation
Moderate Deforestation
Reforestation

Table 8

Trace Gas Emissions for Nine Scenarios

	1985*	2000	2025	2050	2075	2100
CO_2 (Pg C)						
2030 High Emissions/Lower	6.0	7.3	10.1	10.9	10.7	12.8
2030 High Emissions/Higher	5.9	8.0	12.9	19.5	26.7	32.0
2060 Low Emissions/Lower	5.9	5.4	5.8	5.8	6.0	6.6
2060 Low Emissions/Higher	5.9	5.7	7.0	9.2	11.6	14.0
Control Policies/Lower	5.9	5.4	5.8	5.7	3.9	3.0
Control Policies/Higher	5.9	5.7	6.8	8.5	6.4	4.0
Accelerated Policies/Lower	5.9	5.4	4.9	2.4	2.1	1.8
Accelerated Policies/Higher	6.0	5.8	5.3	3.5	3.8	3.6
Accelerated Policies/Alternate	6.0	4.6	3.8	3.7	3.5	2.6
N_2O (Tg N)						
2030 High Emissions/Lower	12.5	14.3	16.6	16.8	15.4	15.4
2030 High Emissions/Higher	12.5	14.2	16.2	17.7	19.2	19.7
2060 Low Emissions/Lower	12.5	13.1	13.8	13.8	13.9	14.1
2060 Low Emissions/Higher	12.5	13.1	14.0	14.3	14.8	15.2
Control Policies/Lower	12.5	12.9	13.1	12.8	12.3	12.0
Control Policies/Higher	12.5	12.9	13.3	13.2	12.8	12.4
Accelerated Policies/Lower	12.5	12.9	13.0	12.6	12.4	12.2
Acclerated Policies/Higher	12.5	12.9	13.2	12.8	12.5	12.3
CH_4 (Tg CH_4)						
2030 High Emissions/Lower	540.5	607.3	734.5	809.7	823.4	877.6
2030 High Emissions/Higher	540.5	620.6	787.1	988.5	1160.6	1248.3
2060 Low Emissions/Lower	540.5	571.6	645.7	689.3	685.9	678.5
2060 Low Emissions/Higher	540.5	582.0	685.2	758.3	778.8	792.7
Control Policies/Lower	540.5	554.2	592.9	590.4	535.9	492.5
Control Policies/Higher	540.5	561.7	622.5	652.8	588.1	517.4
Accelerated Policies/Lower	540.7	560.8	572.4	536.7	505.7	472.4
Accelerated Policies/Higher	540.7	570.8	594.5	569.4	554.5	531.8
NO_x (Tg N)						
2030 High Emissions/Lower	50.8	55.0	63.8	66.4	65.5	72.5
2030 High Emissions/Higher	50.2	57.5	72.9	95.0	115.5	130.6
2060 Low Emissions/Lower	50.3	49.6	44.3	38.5	37.7	39.2
2060 Low Emissions/Higher	50.2	50.8	48.0	43.9	45.1	48.4
Control Policies/Lower	50.3	49.7	44.5	39.3	36.5	36.3
Control Policies/Higher	50.2	50.8	48.3	44.5	42.1	42.4
Accelerated Policies/Lower	51.2	49.8	46.2	42.0	41.7	42.5
Accelerated Policies/Higher	51.2	51.1	53.5	45.6	44.2	44.4
CO (Tg C)						
2030 High Emissions/Lower	537.5	633.8	841.9	855.3	622.4	637.8
2030 High Emissions/Higher	537.0	597.4	720.4	908.6	1055.8	1218.0
2060 Low Emissions/Lower	537.3	428.6	337.8	287.2	279.9	277.9
2060 Low Emissions/Higher	537.0	426.6	334.3	282.0	279.7	283.8
Control Policies/Lower	537.3	428.5	337.7	287.8	274.8	269.2
Control Policies/Higher	537.0	426.4	334.6	283.0	273.8	271.3
Accelerated Policies/Lower	540.8	412.3	338.9	295.9	299.8	296.0
Accelerated Policies/Higher	540.8	409.9	342.7	278.1	270.2	265.9

Table 8 (continued)

Trace Gas Emissions

	1985*	2000	2025	2050	2075	2100
CFC-11 (Gg)						
2030 High Emissions/Lower	278.3	305.1	244.7	251.5	253.0	253.0
2030 High Emissions/Higher	278.3	305.1	244.7	251.5	253.0	253.0
2060 Low Emissions/Lower	278.3	302.1	226.7	223.2	223.2	223.2
2060 Low Emission/Higher	278.3	302.1	226.7	223.2	223.2	223.2
Control Policies/Lower	278.3	197.1	10.6	0.0	0.0	0.0
Control Policies/Higher	278.3	197.1	10.6	0.0	0.0	0.0
Accelerated Policies/Lower	278.3	197.1	10.6	0.0	0.0	0.0
Accelerated Policies/Higher	278.3	197.1	10.6	0.0	0.0	0.0
CFC-12 (Gg)						
2030 High Emissions/Lower	361.9	376.0	302.7	314.1	316.1	316.1
2030 High Emissions/Higher	361.9	376.0	302.7	314.1	316.1	316.1
2060 Low Emissions/Lower	361.9	372.2	279.1	277.9	277.9	277.9
2060 Low Emissions/Higher	361.9	372.2	279.1	277.9	277.9	277.9
Control Policies/Lower	361.9	262.2	10.2	0.0	0.0	0.0
Control Policies/Higher	361.9	262.2	10.2	0.0	0.0	0.0
Accelerated Policies/Lower	361.9	262.2	10.2	0.0	0.0	0.0
Accelerated Policies/Higher	361.9	262.2	10.2	0.0	0.0	0.0
HCFC-22 (Gg)						
2030 High Emissions/Lower	96.9	522.9	1340.4	2681.3	2961.0	2961.0
2030 High Emissions/Higher	96.9	522.9	1340.4	2681.3	2961.0	2961.0
2060 Low Emissions/Lower	96.9	525.7	1357.2	2707.2	2988.1	2988.1
2060 Low Emissions/Higher	96.9	525.7	1357.2	2707.2	2988.1	2988.1
Control Policies/Lower	96.9	638.5	1571.9	2927.6	3208.5	3208.5
Control Policies/Higher	96.9	638.5	1571.9	2927.6	3208.5	3208.5
Accelerated Policies/Lower	73.8	206.1	407.0	754.5	879.1	879.1
Accelerated Policies/Higher	73.8	206.1	407.0	754.5	879.1	879.1
CFC-113 (Gg)						
2030 High Emissions/Lower	150.6	132.6	122.0	124.8	124.8	124.8
2030 High Emissions/Higher	150.6	132.6	122.0	124.8	124.8	124.8
2060 Low Emissions/Lower	150.6	131.4	116.6	116.6	116.6	116.6
2060 Low Emissions/Higher	150.6	131.4	116.6	116.6	116.6	116.6
Control Policies/Lower	150.6	29.7	0.0	0.0	0.0	0.0
Control Policies/Higher	150.6	29.7	0.0	0.0	0.0	0.0
Accelerated Policies/Lower	150.5	112.7	8.8	14.0	14.0	14.0
Accelerated Policies/Higher	150.5	112.7	8.8	14.0	14.0	14.0

---

* Slight variation in initial (1985) values among scenarios is due to minor differences in the way the scenarios were specified in the model.

Table 9

Trace Gas Emissions For Average Emissions Scenarios

	1985*	2000	2025	2050	2075	2100
CO_2 (Pg C)						
2030 High Emissions	5.9	7.7	11.5	15.2	18.7	22.4
2060 Low Emissions	5.9	5.5	6.4	7.5	8.8	10.3
Control Policies	5.9	5.6	6.3	7.1	5.1	3.5
Accelerated Policies	6.0	5.6	5.1	2.9	3.0	2.7
Alternate Acclerated Policies	6.0	4.6	3.8	3.7	3.5	2.6
N_2O (Tg N)						
2030 High Emissions	12.5	14.2	16.4	17.3	17.3	17.6
2060 Low Emissions	12.5	13.1	13.9	14.1	14.3	14.6
Control Policies	12.5	12.9	13.2	13.0	12.5	12.2
Accelerated Policies	12.5	12.9	13.1	12.7	12.5	12.3
CH_4 (Tg CH_4)						
2030 High Emissions	540.5	613.9	670.8	899.1	992.0	1062.9
2060 Low Emissions	540.5	576.8	665.4	723.8	732.4	735.6
Control Policies	540.5	557.9	607.7	621.6	562.0	504.9
Accelerated Policies	540.7	411.1	340.8	287.0	285.0	281.0
NO_x (Tg N)						
2030 High Emissions	50.5	56.2	68.3	80.7	90.5	101.5
2060 Low Emissions	50.2	50.2	46.1	41.2	41.4	43.8
Control Policies	50.2	50.3	46.4	41.9	39.3	39.4
Accelerated Policies	51.2	50.5	49.9	43.8	42.9	43.5
CO (Tg C)						
2030 High Emissions	537.2	615.6	781.2	881.9	839.1	927.9
2060 Low Emissions	537.2	427.6	336.1	284.6	279.8	280.9
Control Policies	537.2	427.4	336.1	285.4	274.3	270.2
Accelerated Policies	540.8	411.1	340.8	287.0	285.0	281.0
CFC-11 (Gg)						
2030 High Emissions	278.3	305.1	244.7	251.5	353.0	353.0
2060 Low Emissions	278.3	302.1	226.7	223.2	223.2	223.2
Control Policies	278.3	197.1	10.6	0.0	0.0	0.0
Accelerated Policies	278.3	197.1	10.6	0.0	0.0	0.0
CFC-12 (Gg)						
2030 High Emissions	361.9	376.0	302.7	314.1	316.1	316.1
2060 Low Emissions	361.9	372.2	279.1	277.9	277.9	277.9
Control Policies	361.9	262.2	10.2	0.0	0.0	0.0
Accelerated Policies	361.9	262.2	10.2	0.0	0.0	0.0
HCFC-22 (Gg)						
2030 High Emissions	96.9	522.9	1340.4	2681.3	2961.0	2961.0
2060 Low Emissions	96.9	525.7	1357.2	2707.2	2988.1	2988.1
Control Policies	96.9	638.5	1571.9	2927.6	3208.5	3208.5
Accelerated Policies	96.9	638.5	1571.9	2927.6	3208.5	3208.5
CFC-113 (Gg)						
2030 High Emissions	150.6	132.6	122.0	124.8	124.8	124.8
2060 Low Emissions	150.6	131.4	116.6	116.6	116.6	116.6
Control Policies	150.6	29.7	0.0	0.0	0.0	0.0
Accelerated Policies	150.6	29.7	0.0	0.0	0.0	0.0

* Slight variation in initial (1985) values is due to minor differences in the way scenarios are specified in the model.

Figure 15

GLOBAL CO2 EMISSIONS BY ACTIVITY: HIGHER GROWTH

(Petagrams Carbon)

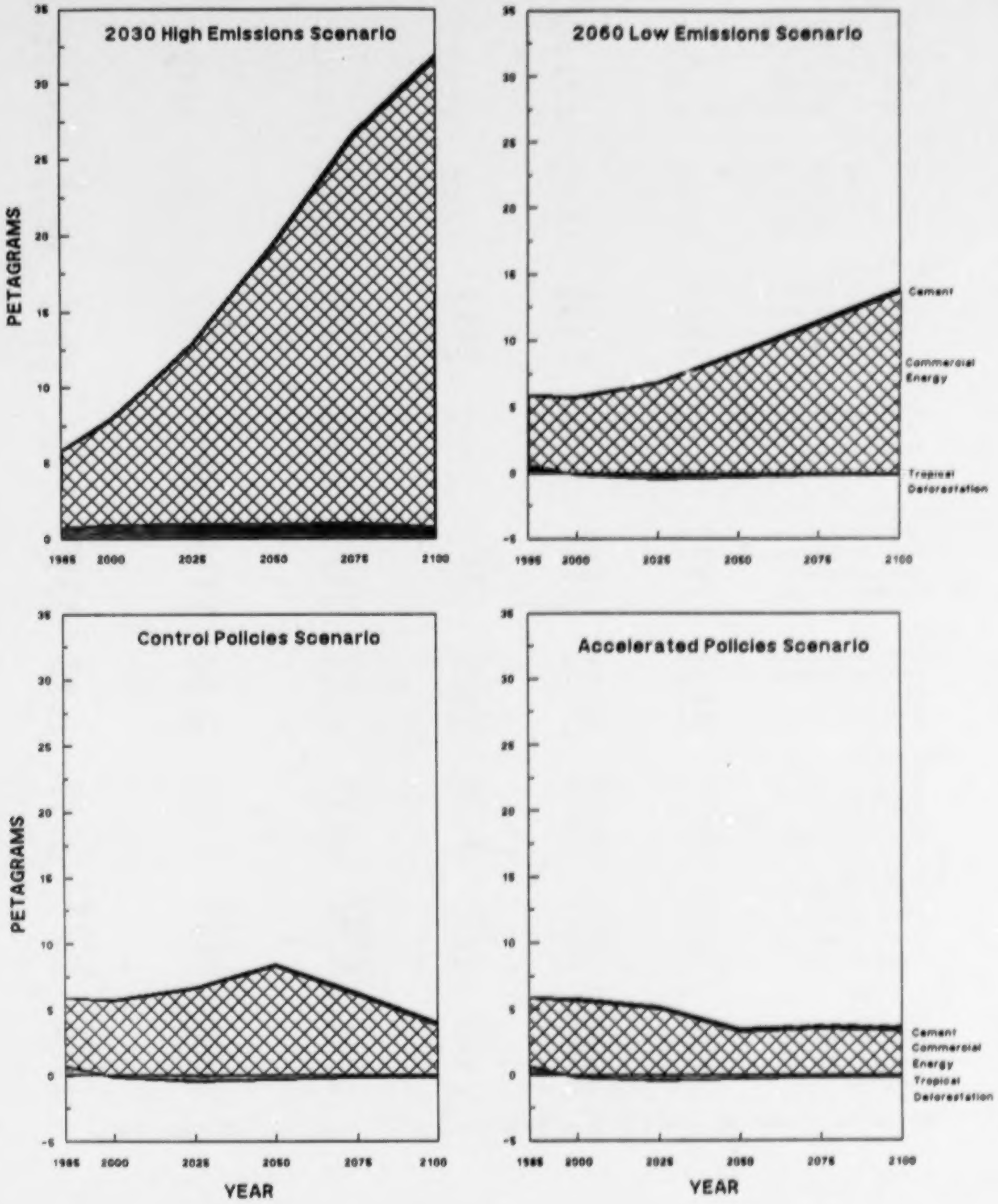


Figure 16

GLOBAL CO2 EMISSIONS BY ACTIVITY: LOWER GROWTH

(Petagrams Carbon)

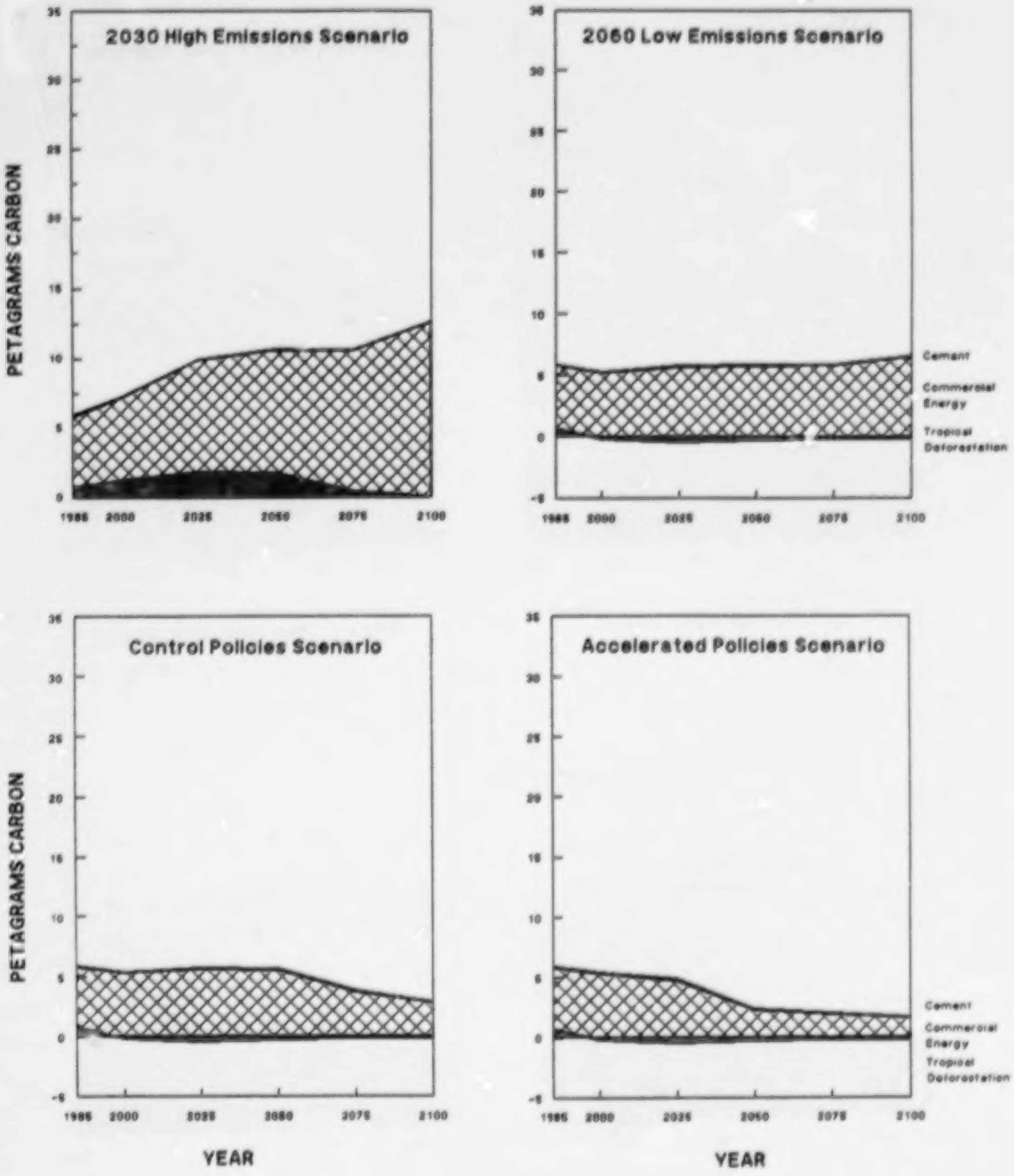


Figure 17

GLOBAL CH4 EMISSIONS BY ACTIVITY: HIGHER GROWTH

(Teragrams/Year)

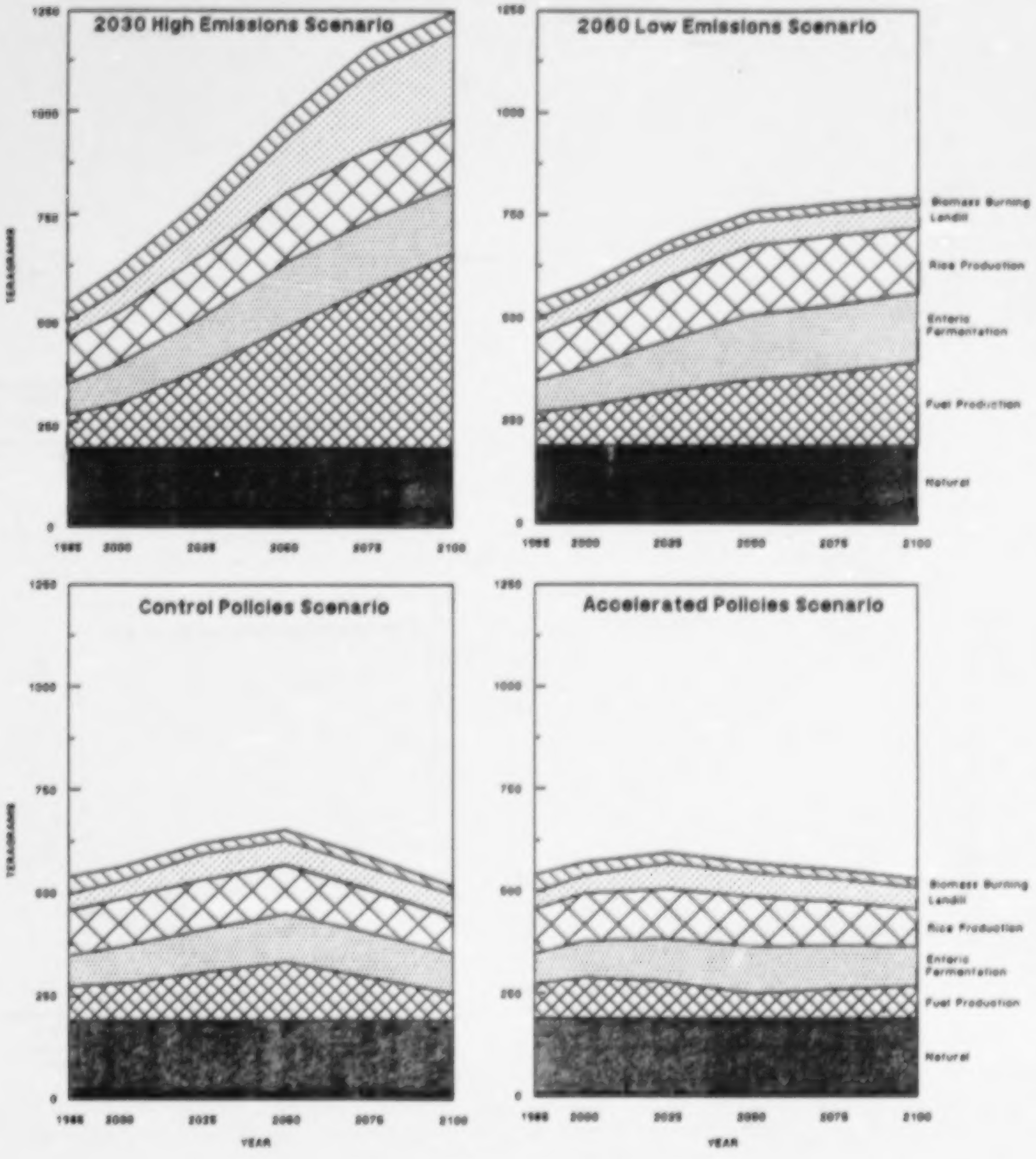


Figure 18

GLOBAL CH4 EMISSIONS BY ACTIVITY: LOWER GROWTH

(Teragrams/Year)

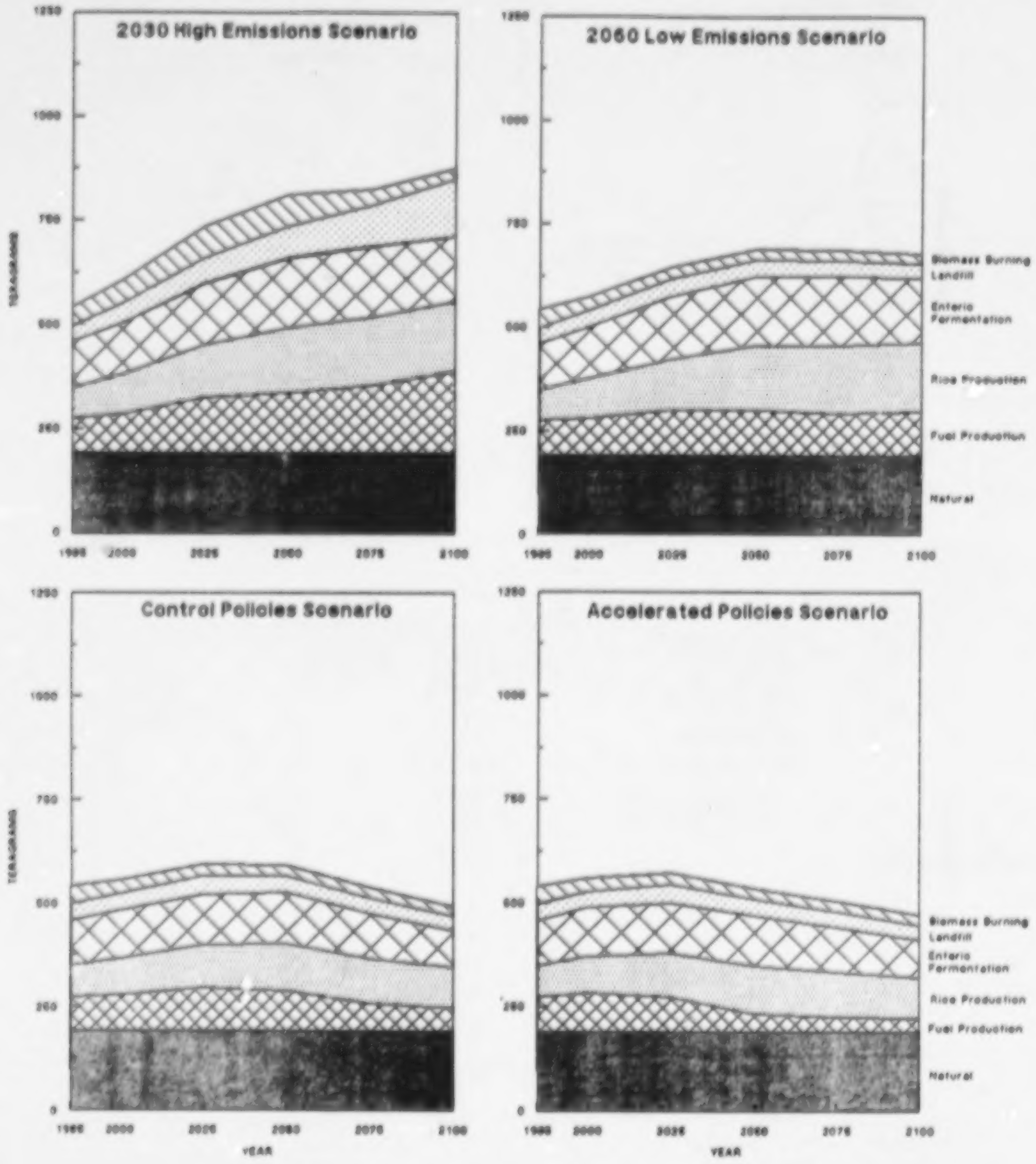
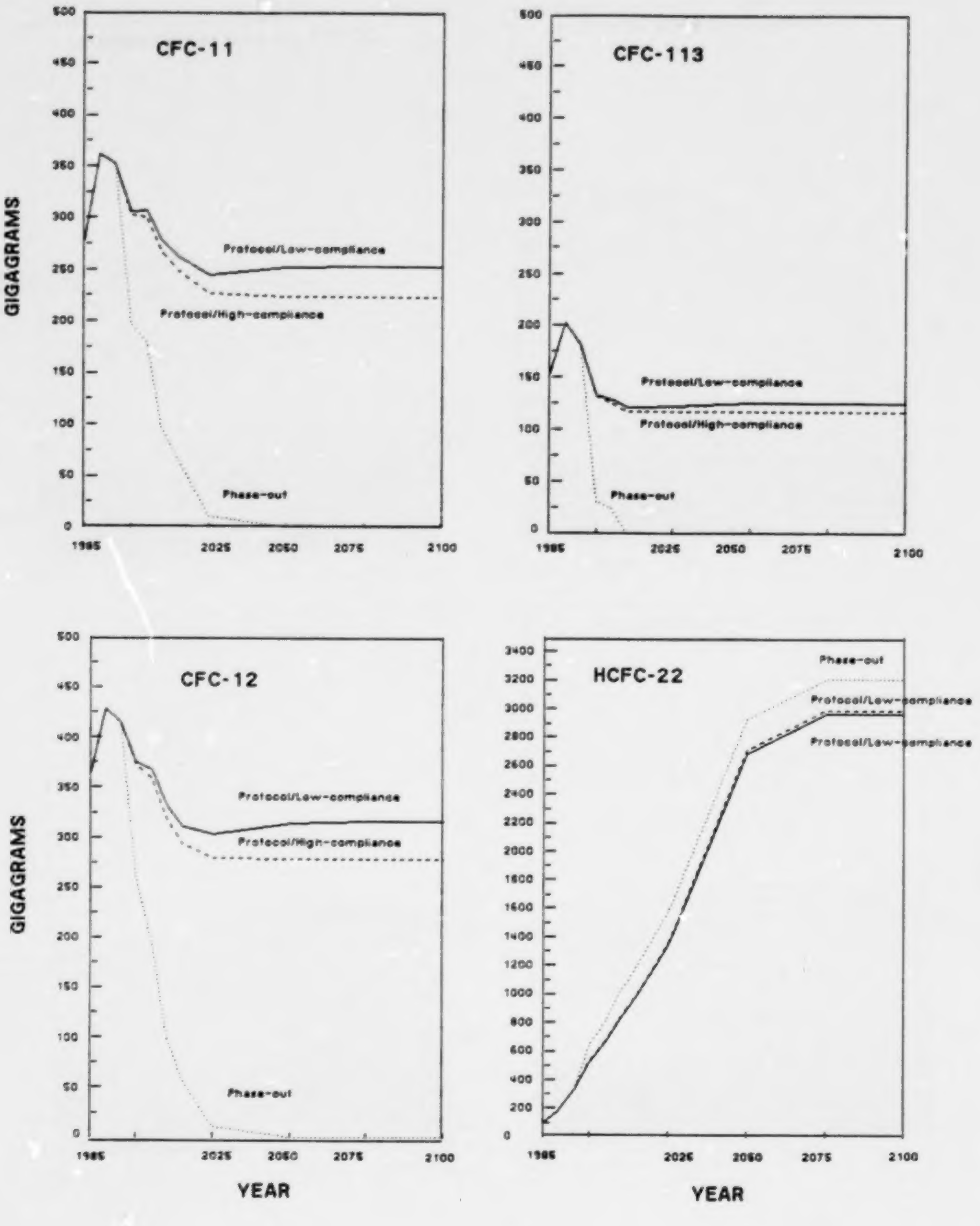


Figure 19

EMISSIONS OF MAJOR CFCs
(GIGAGRAMS)



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ATTACHMENT

This attachment provides the detailed results of the scenarios described in this report. As outlined above, we have constructed eight detailed scenarios of future patterns of economic and technological development starting with alternative assumptions about the rate of economic growth. These eight scenarios cannot capture all the possibilities of course; rather, they allow us to explore possible climatic outcomes of future human activities. Emissions and atmospheric concentrations results are also presented for an Average scenario, which is simply an average of the Lower Growth and Higher Growth scenarios.

Energy Use and Emissions

The following tables present the results for the 2030 High Emissions/Lower Growth scenario for each of the nine regions (these tables can be found at the end of the Attachment):

- Table A-1: Primary Energy Supply
- Tables A-2 to A-8: Primary Energy Supply by Resource, i.e., oil, gas, coal, biomass, hydroelectric, nuclear, and solar, respectively
- Table A-9: Primary Energy Consumption
- Table A-10: Secondary Energy Consumption, broken down into fuel versus electricity
- Tables A-11 to A-13: Secondary Fuel Consumption by Type, i.e., oil, gas, solids, respectively
- Table A-14: Residential/Commercial Energy Consumption: Fuel versus Electricity

- Table A-15: Industrial Energy Consumption: Fuel versus Electricity
- Table A-16: Transportation Energy Consumption: Fuel versus Electricity
- Table A-17: Electric Utility Energy Consumption By Type
- Table A-18: Energy Conversion Efficiency at Electric Utility Powerplants
- Table A-19: Synthetic Production of Oil and Gas
- Table A-20: Energy Used for Synthetic Fuel Production by Type
- Table A-21: CO_2 Emissions from Energy Consumption (in petagrams of carbon)
- Table A-22: CO Emissions from Energy Consumption (in teragrams of carbon)
- Table A-23: NO_x Emissions from Energy Consumption (in teragrams of nitrogen)

This same information is provided for each of the scenarios. Tables A-24 to A-46 summarize the 2030 High Emissions/Higher Growth scenario. Tables A-47 to A-69 summarize the 2060 Low Emissions/Lower Growth scenario. Tables A-70 to A-92 summarize the 2060 Low Emissions/Higher Growth scenario. Tables A-93 to A-115 summarize the Control Policies/Lower Growth scenario. Tables A-116 to A-138 summarize the Control Policies/Higher Growth scenario. Finally, Tables A-139 to A-161 summarize the Accelerated Policies/Lower growth scenario and Tables A-162 to A-184 summarize the Accelerated Policies/Higher Growth scenario.

Chlorofluorocarbon and Halon Emissions

The CFC and halon emission estimates were based on *Regulatory Impact Analysis: Protection of Stratospheric Ozone*, U.S. EPA (August 1988). This report (U.S. EPA 1988) was developed by the U.S. EPA to support U.S. participation in the Montreal Protocol. The CFC emission estimates from each of the scenarios are summarized in Table 8 in the main body of this appendix.

Agriculture

As discussed above, global estimates of agricultural production and fertilizer consumption were derived from the Basic Linked System (BLS) at the Center for Agricultural and Rural Development at Iowa State University. One case was devised for this analysis. Key results for the cases for each of the nine regions are summarized as follows (tables are at the end of this document):

- Table A-185: Production of Wheat
- Table A-186: Production of Rice
- Table A-187: Production of Coarse Grains
- Table A-188: Production of Meats
- Table A-189: Production of Dairy Products

- Table A-190: Production of Other Animals (e.g., pork, poultry, eggs, fish)

- Table A-191: Amount of Fertilizer Use

- Table A-192: Amount of Land Under Rice Cultivation

Greenhouse Gas Emissions and Concentrations

The human activities portrayed in the previous tables, including energy production and consumption, agricultural activities, CFC consumption, and other industrial activities, cause a number of greenhouse gas emissions. Additionally, various greenhouse gases are also produced from natural processes, such as CH_4 production from wetlands. These emission forecasts are summarized below for each scenario for each major emission category. For example, in the 2030 High Emissions/Lower Growth scenario (all tables can be found at the end of this document):

- Table A-193: CO_2 Emissions by Type of Activity (in petagrams of carbon)

- Table A-194: N_2O Emissions by Type of Activity (in teragrams of nitrogen)

- Table A-195: CH_4 Emissions by Type of Activity (in teragrams of CH_4)

- Table A-196: NO_x Emissions by Type of Activity (in teragrams of nitrogen)

- Table A-197: CO Emissions by Type of Activity (in teragrams of carbon)

- **Table A-198: Atmospheric concentrations of the major greenhouse gases**

This same information is provided for each of the scenarios. Tables A-199 to A-204 summarize emissions from the 2030 High Emissions/Higher Growth scenario, Tables A-205 to A-210 summarize the 2060 Low Emissions/Lower Growth scenario, Tables A-211 to A-216 summarize the 2060 Low Emissions/Higher Growth scenario, Tables A-217 to A-222 summarize the Control Policies/Lower Growth scenario, and Tables A-223 to A-228 summarize the Control Policies/Higher Growth scenario. Finally, Tables A-229 to A-234 summarize the Accelerated Policies/Lower growth scenario and Tables A-235 to A-240 summarize the Accelerated Policies/Higher Growth scenario.

Results From The Average Scenarios

The Average scenarios were derived by averaging the results from the Lower Growth and Higher Growth scenarios. This section presents the results from the Average scenarios for emissions and the atmospheric concentration of each gas. The emission forecasts are summarized below for each of the four requested emission scenarios. For example, in the 2030 High Emissions/Average scenario (all tables can be found at the end of this document):

- Table A-241: CO_2 Emissions by Type of Activity (in petagrams of carbon)
- Table A-242: N_2O Emissions by Type of Activity (in teragrams of nitrogen)
- Table A-243: CH_4 Emissions by Type of Activity (in teragrams of CH_4)

- Table A-244: NO_x Emissions by Type of Activity (in teragrams of nitrogen)

- Table A-245: CO Emissions by Type of Activity (in teragrams of carbon)

- Table A-246: Atmospheric concentrations of the major greenhouse gases

This same information is provided for each of the emission profiles. Tables A-247 to A-252 summarize emissions from the 2060 Low Emissions/Average scenario; Tables A-253 to A-259 summarize the Control Policies/Average scenario; and Tables A-260 to A-265 summarize the Accelerated Policies/Average scenario.

ENERGY REPORT: 2030 HIGH EMISSIONS - LOWER GROWTH

TABLE A-1

PRIMARY ENERGY SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	66.4	58.2	63.0	69.7	79.8	104.8
OECD Europe-Canada	47.0	47.7	59.3	61.5	63.8	75.0
OECD Pacific	8.8	10.6	12.8	14.6	18.0	23.6
Centrally Planned Eur.	79.9	89.4	118.2	122.2	145.1	203.6
Centrally Planned Asia	26.7	30.5	52.4	69.8	92.9	129.0
Middle East	24.9	48.1	69.7	67.7	60.7	40.9
Africa	17.2	23.3	33.2	38.9	40.9	47.3
Latin America	21.2	23.0	39.8	63.2	71.1	66.6
South and East Asia	21.7	17.1	23.9	26.6	30.2	36.3
TOTAL	313.8	347.9	472.3	534.2	602.5	727.1

TABLE A-2

PRIMARY OIL SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	22.7	12.6	8.0	8.4	7.5	11.1
OECD Europe-Canada	12.4	9.6	8.3	6.1	4.0	2.5
OECD Pacific	1.2	.6	.2	.0	.0	.1
Centrally Planned Eur.	26.5	21.9	18.0	12.5	7.8	5.2
Centrally Planned Asia	5.4	6.8	6.8	5.2	3.2	2.4
Middle East	23.3	44.9	56.6	45.3	29.9	18.6
Africa	11.3	16.7	21.2	18.1	12.4	8.4
Latin America	14.7	11.3	20.2	33.6	33.3	24.2
South and East Asia	11.1	6.0	3.5	2.3	1.7	1.5
TOTAL	128.6	130.4	142.8	131.5	99.8	74.0

TABLE A-3

PRIMARY GAS SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	17.2	15.4	11.7	8.3	5.5	4.6
OECD Europe-Canada	9.6	8.9	11.2	9.8	5.9	4.1
OECD Pacific	.7	1.6	1.7	1.1	.7	.4
Centrally Planned Eur.	23.4	28.4	34.3	25.4	12.6	6.1
Centrally Planned Asia	.5	1.5	4.0	4.1	2.7	1.4
Middle East	1.5	3.0	11.3	18.6	26.5	17.3
Africa	1.7	2.6	5.2	6.4	6.1	4.2
Latin America	2.6	4.7	8.2	7.2	4.7	2.7
South and East Asia	2.9	1.9	2.7	2.5	2.9	1.8
TOTAL	60.1	68.0	90.3	83.4	67.6	42.6

TABLE A-4

PRIMARY COAL SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	19.7	21.5	30.4	37.6	48.7	67.9
OECD Europe-Canada	10.3	11.4	18.7	23.9	30.0	41.3
OECD Pacific	3.9	4.8	6.9	8.9	11.6	16.2
Centrally Planned Eur.	25.1	32.2	51.7	63.3	97.9	159.7
Centrally Planned Asia	19.8	19.9	33.5	45.9	67.3	99.6
Middle East	.0	.0	.0	.0	.0	.0
Africa	4.0	3.6	5.1	6.5	9.7	16.5
Latin America	.6	1.0	1.7	2.5	3.8	2.8
South and East Asia	6.1	6.4	11.1	8.4	6.0	5.6
TOTAL	89.5	100.8	159.1	197.0	275.0	409.6

TABLE A-5

PRIMARY BIOMASS ENERGY SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.0	1.7	2.7	4.1
OECD Europe-Canada	.0	.0	.0	1.2	1.9	2.9
OECD Pacific	.0	.0	.0	.6	1.0	1.5
Centrally Planned Eur.	.0	.0	.0	3.2	5.1	7.6
Centrally Planned Asia	.0	.0	.0	1.5	2.4	3.6
Middle East	.0	.0	.0	.0	.0	.1
Africa	.0	.0	.0	4.1	6.7	10.0
Latin America	.0	.0	.0	6.2	10.0	15.0
South and East Asia	.0	.0	.0	2.7	4.4	6.6
TOTAL	.0	.0	.0	21.2	34.2	51.4

TABLE A-6

PRIMARY HYDROELECTRIC SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.3	3.8	4.3	4.6	4.7	4.8
OECD Europe-Canada	8.2	9.6	10.6	11.0	11.1	11.1
OECD Pacific	1.2	1.3	1.3	1.4	1.4	1.4
Centrally Planned Eur.	2.5	3.1	3.6	3.7	3.7	3.7
Centrally Planned Asia	1.0	2.3	6.4	10.0	11.3	11.6
Middle East	.1	.2	.4	.6	.7	.7
Africa	.2	.4	1.3	3.2	5.3	6.6
Latin America	3.3	6.0	9.7	13.7	19.3	20.6
South and East Asia	1.4	2.6	5.9	9.4	11.4	12.1
TOTAL	21.2	29.3	43.5	57.6	68.9	72.6

TABLE A-7

PRIMARY NUCLEAR SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.5	4.4	6.7	6.2	7.3	8.4
OECD Europe-Canada	6.5	7.9	9.3	7.7	8.9	10.6
OECD Pacific	1.8	2.2	2.3	1.9	2.4	2.9
Centrally Planned Eur.	2.4	3.3	8.0	9.6	12.3	14.5
Centrally Planned Asia	.0	.0	1.3	2.1	4.1	7.1
Middle East	.0	.0	1.0	2.2	2.5	2.9
Africa	.0	.0	.3	.4	.5	1.1
Latin America	.0	.0	.0	.0	.0	.9
South and East Asia	.2	.2	.5	.9	2.6	5.9
TOTAL	14.4	18.0	29.4	31.0	40.6	54.3

TABLE A-8

PRIMARY SOLAR SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.5	1.9	2.9	3.4	3.9
OECD Europe-Canada	.0	.3	1.2	1.8	2.0	2.5
OECD Pacific	.0	.1	.4	.7	.9	1.1
Centrally Planned Eur.	.0	.5	2.6	4.5	5.7	6.8
Centrally Planned Asia	.0	.0	.4	1.0	1.9	3.3
Middle East	.0	.0	.4	1.0	1.1	1.3
Africa	.0	.0	.1	.2	.2	.5
Latin America	.0	.0	.0	.0	.0	.4
South and East Asia	.0	.0	.2	.4	1.2	2.8
TOTAL	.0	1.4	7.2	12.5	16.4	22.6

TABLE A-9

PRIMARY ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	77.2	85.4	96.4	95.5	96.8	106.8
OECD Europe-Canada	58.4	65.5	77.1	79.0	79.3	88.9
OECD Pacific	18.1	19.5	22.1	24.1	26.1	31.3
Centrally Planned Eur.	72.5	89.1	128.5	136.9	148.1	168.3
Centrally Planned Asia	18.9	27.4	46.2	66.8	87.8	116.0
Middle East	8.4	11.1	28.6	32.0	28.8	29.2
Africa	7.1	9.3	12.8	17.5	23.1	34.7
Latin America	16.0	21.5	32.4	40.8	49.2	58.6
South and East Asia	13.7	18.8	28.6	43.0	63.5	93.8
TOTAL	290.3	347.6	472.7	535.6	602.7	727.6

TABLE A-10

SECONDARY ENERGY CONSUMPTION: FUEL VERSUS ELECTRICITY

FUEL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	50.1	52.1	50.6	48.9	45.7	46.6
OECD Europe-Canada	36.8	37.4	38.6	37.6	35.2	37.0
OECD Pacific	10.9	11.5	11.6	12.0	12.2	14.2
Centrally Planned Eur.	39.3	47.2	66.3	67.8	64.9	63.2
Centrally Planned Asia	13.6	19.2	29.9	40.5	46.6	51.5
Middle East	5.6	7.4	19.0	20.7	17.8	17.2
Africa	4.3	5.9	8.0	9.9	11.7	14.4
Latin America	11.5	15.5	22.7	25.3	26.6	28.9
South and East Asia	9.5	12.9	18.3	26.3	35.3	47.0
TOTAL	181.6	209.1	265.0	289.0	296.0	320.0

ELECTRICITY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	8.6	11.0	15.7	16.0	17.4	18.9
OECD Europe-Canada	7.1	9.3	13.1	13.9	14.8	16.4
OECD Pacific	2.3	2.6	3.7	4.1	4.8	5.5
Centrally Planned Eur.	10.4	13.7	21.4	23.8	27.9	31.0
Centrally Planned Asia	1.5	2.5	5.1	8.3	12.6	18.4
Middle East	.8	1.1	3.3	4.0	4.0	4.4
Africa	.7	1.0	1.5	2.0	2.9	4.6
Latin America	1.4	2.0	3.2	4.6	6.4	8.6
South and East Asia	1.2	1.8	3.3	5.3	9.5	16.2
TOTAL	34.0	45.0	70.3	82.0	100.3	124.0

TOTAL ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	58.7	63.1	66.3	64.9	63.1	65.5
OECD Europe-Canada	43.9	46.7	51.7	51.5	50.0	53.4
OECD Pacific	13.2	14.1	15.3	16.1	17.0	19.7
Centrally Planned Eur.	49.7	60.9	87.7	91.6	92.8	94.2
Centrally Planned Asia	15.1	21.7	35.0	48.8	59.2	69.9
Middle East	6.4	8.5	22.3	24.7	21.8	21.6
Africa	5.0	6.9	9.5	11.9	14.6	19.0
Latin America	12.9	17.5	25.9	29.9	33.0	37.5
South and East Asia	10.7	14.7	21.6	31.6	44.8	63.2
TOTAL	215.6	254.1	335.3	371.0	396.3	444.0

TABLE A-11

SECONDARY OIL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	31.4	32.1	27.4	25.8	24.7	27.4
OECD Europe-Canada	24.9	25.1	23.3	22.1	20.9	23.4
OECD Pacific	8.1	8.3	7.4	7.4	7.6	9.6
Centrally Planned Eur.	15.6	18.9	27.5	26.7	26.0	28.0
Centrally Planned Asia	2.7	3.7	4.7	6.7	9.5	14.0
Middle East	4.8	6.2	14.2	15.3	13.5	13.6
Africa	2.7	3.6	4.6	5.0	5.4	6.6
Latin America	9.1	11.9	15.3	16.3	17.0	19.4
South and East Asia	5.7	7.3	8.0	11.2	15.0	22.2
TOTAL	105.0	117.1	132.4	136.5	139.6	164.2

TABLE A-12

SECONDARY GAS CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	14.4	14.8	16.4	15.7	13.4	11.6
OECD Europe-Canada	6.9	6.8	7.8	7.4	6.0	5.2
OECD Pacific	.8	.9	1.1	1.1	.9	.7
Centrally Planned Eur.	13.5	18.6	25.5	26.9	25.4	23.3
Centrally Planned Asia	.1	.2	.4	.5	.4	.5
Middle East	.8	1.2	4.8	5.4	4.3	3.6
Africa	.3	.5	.6	.7	.8	.9
Latin America	1.8	2.5	4.8	5.6	5.7	5.5
South and East Asia	.9	1.3	2.1	2.9	3.8	4.8
TOTAL	39.5	46.8	63.5	66.2	60.7	56.1

TABLE A-13

SECONDARY SOLIDS CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	4.3	5.2	6.8	7.4	7.6	7.6
OECD Europe-Canada	5.0	5.5	7.5	8.1	8.3	8.4
OECD Pacific	2.0	2.3	3.1	3.5	3.7	3.9
Centrally Planned Eur.	10.2	9.7	13.3	14.2	13.5	11.9
Centrally Planned Asia	10.8	15.3	24.8	33.3	36.7	37.0
Middle East	.0	.0	.0	.0	.0	.0
Africa	1.3	1.8	2.8	4.2	5.5	6.9
Latin America	.6	1.1	2.6	3.4	3.9	4.0
South and East Asia	2.9	4.3	8.2	12.2	16.5	20.0
TOTAL	37.1	45.2	69.1	86.3	95.7	99.7

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TABLE A-14

RESIDENTIAL/COMMERCIAL ENERGY CONSUMPTION: FUEL VERSUS ELECTRICITY

FUEL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	11.5	10.8	10.6	9.9	8.6	7.5
OECD Europe-Canada	11.0	9.7	9.0	7.7	6.3	5.2
OECD Pacific	1.5	1.6	1.8	1.6	1.4	1.3
Centrally Planned Eur.	14.7	15.8	22.0	23.7	23.8	23.0
Centrally Planned Asia	3.3	4.1	5.1	7.7	9.2	10.4
Middle East	.3	.6	1.7	2.0	1.9	1.9
Africa	.3	.7	1.3	1.8	2.3	3.0
Latin America	1.6	2.0	2.6	3.1	3.5	3.7
South and East Asia	2.0	2.6	3.7	5.3	7.2	9.1
TOTAL	46.2	47.9	57.8	62.8	64.2	65.1

ELECTRICITY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	5.7	7.6	11.2	11.2	11.8	12.4
OECD Europe-Canada	3.9	5.0	6.9	6.7	6.5	6.4
OECD Pacific	1.1	1.3	2.0	2.1	2.4	2.6
Centrally Planned Eur.	2.9	3.6	6.0	6.9	8.4	9.8
Centrally Planned Asia	.2	.4	1.0	1.8	2.8	4.3
Middle East	.2	.3	1.1	1.4	1.5	1.7
Africa	.3	.4	.7	1.0	1.4	2.2
Latin America	.5	.8	1.2	1.8	2.5	3.4
South and East Asia	.4	.7	1.3	2.2	3.8	6.4
TOTAL	15.2	20.1	31.4	35.1	41.1	49.2

TOTAL ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	17.2	18.4	21.8	21.1	20.4	19.9
OECD Europe-Canada	14.9	14.7	15.9	14.4	12.8	11.6
OECD Pacific	2.6	2.9	3.8	3.7	3.8	3.9
Centrally Planned Eur.	17.6	19.4	28.0	30.6	32.2	32.8
Centrally Planned Asia	3.5	4.5	6.1	9.5	12.0	14.7
Middle East	.5	.9	2.8	3.4	3.4	3.6
Africa	.6	1.1	2.0	2.8	3.7	5.2
Latin America	2.1	2.8	3.8	4.9	6.0	7.1
South and East Asia	2.4	3.3	5.0	7.5	11.0	15.5
TOTAL	61.4	68.0	89.2	97.9	105.3	114.3

TABLE A-15

INDUSTRIAL ENERGY CONSUMPTION: FUEL VERSUS ELECTRICITY

FUEL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	17.5	18.9	19.0	18.8	17.2	16.0
OECD Europe-Canada	12.2	12.8	12.9	13.2	12.5	12.3
OECD Pacific	4.7	4.8	4.5	4.8	4.8	5.3
Centrally Planned Eur.	15.8	17.8	21.1	21.4	18.7	15.5
Centrally Planned Asia	9.3	13.5	21.8	27.9	30.3	29.6
Middle East	4.2	5.3	13.2	13.9	11.3	9.8
Africa	1.9	2.3	2.6	3.7	4.7	5.6
Latin America	5.6	7.6	11.4	12.9	13.1	13.0
South and East Asia	4.9	6.9	9.8	14.1	18.1	21.9
TOTAL	76.1	89.9	116.3	130.7	130.7	129.0

ELECTRICITY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	2.9	3.4	4.5	4.8	5.6	6.5
OECD Europe-Canada	3.0	4.1	5.9	6.8	7.9	9.4
OECD Pacific	1.1	1.3	1.7	2.0	2.4	2.9
Centrally Planned Eur.	7.4	10.0	15.3	16.8	19.3	21.0
Centrally Planned Asia	1.3	2.1	4.1	6.4	9.6	13.7
Middle East	.6	.8	2.2	2.6	2.5	2.7
Africa	.4	.6	.8	1.0	1.5	2.4
Latin America	.9	1.2	2.0	2.8	3.9	5.2
South and East Asia	.8	1.1	2.0	3.1	5.6	9.6
TOTAL	18.4	24.6	38.5	46.3	58.3	73.4

TOTAL ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	20.4	22.3	23.5	23.6	22.8	22.5
OECD Europe-Canada	15.2	16.9	18.8	20.0	20.4	21.7
OECD Pacific	5.8	6.1	6.2	6.8	7.2	8.2
Centrally Planned Eur.	23.2	27.8	36.4	38.2	38.0	36.5
Centrally Planned Asia	10.6	15.6	25.9	34.3	39.9	43.3
Middle East	4.8	6.1	15.4	16.5	13.8	12.5
Africa	2.3	2.9	3.4	4.7	6.2	8.0
Latin America	6.5	8.8	13.4	15.7	17.0	18.2
South and East Asia	5.7	8.0	11.8	17.2	23.7	31.5
TOTAL	94.5	114.5	154.8	177.0	189.0	202.4

TABLE A-16

TRANSPORTATION ENERGY CONSUMPTION: FUEL VERSUS ELECTRICITY

FUEL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	21.1	22.4	21.0	20.2	19.9	23.1
OECD Europe-Canada	13.6	14.9	16.7	16.7	16.4	19.5
OECD Pacific	4.7	5.1	5.3	5.6	6.0	7.6
Centrally Planned Eur.	8.8	13.6	23.2	22.7	22.4	24.7
Centrally Planned Asia	1.0	1.6	3.0	4.9	7.1	11.5
Middle East	1.1	1.5	4.1	4.8	4.6	5.5
Africa	2.1	2.9	4.1	4.4	4.7	5.8
Latin America	4.3	5.9	8.7	9.3	10.0	12.2
South and East Asia	2.6	3.4	4.8	6.9	10.0	16.0
TOTAL	59.3	71.3	90.9	95.5	101.1	125.9

ELECTRICITY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.0	.0	.0	.0
OECD Europe-Canada	.2	.2	.3	.4	.4	.6
OECD Pacific	.1	.0	.0	.0	.0	.0
Centrally Planned Eur.	.1	.1	.1	.1	.2	.2
Centrally Planned Asia	.0	.0	.0	.1	.2	.4
Middle East	.0	.0	.0	.0	.0	.0
Africa	.0	.0	.0	.0	.0	.0
Latin America	.0	.0	.0	.0	.0	.0
South and East Asia	.0	.0	.0	.0	.1	.2
TOTAL	.4	.3	.4	.6	.9	1.4

TOTAL ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	21.1	22.4	21.0	20.2	19.9	23.1
OECD Europe-Canada	13.8	15.1	17.0	17.1	16.8	20.1
OECD Pacific	4.8	5.1	5.3	5.6	6.0	7.6
Centrally Planned Eur.	8.9	13.7	23.3	22.8	22.6	24.9
Centrally Planned Asia	1.0	1.6	3.0	5.0	7.3	11.9
Middle East	1.1	1.5	4.1	4.8	4.6	5.5
Africa	2.1	2.9	4.1	4.4	4.7	5.8
Latin America	4.3	5.9	8.7	9.3	10.0	12.2
South and East Asia	2.6	3.4	4.8	6.9	10.1	16.2
TOTAL	59.7	71.6	91.3	96.1	102.0	127.3

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TABLE A-17

ELECTRIC UTILITY ENERGY CONSUMPTION

ELECTRICITY OIL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	1.2	2.3	3.1	3.1	2.9	2.9
OECD Europe-Canada	1.4	1.9	2.1	1.9	1.7	1.8
OECD Pacific	1.3	1.1	.8	.8	.7	.8
Centrally Planned Eur.	4.4	5.0	5.0	4.8	4.8	5.0
Centrally Planned Asia	.7	.9	.8	1.1	1.6	2.4
Middle East	1.2	1.1	1.5	1.2	1.0	1.0
Africa	.4	.4	.3	.2	.2	.4
Latin America	.4	.0	.0	.0	.0	.3
South and East Asia	.6	.7	.4	.5	1.0	2.0
TOTAL	11.6	13.4	14.0	13.6	13.9	16.6

ELECTRICITY GAS CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.5	6.2	6.8	6.5	5.4	4.7
OECD Europe-Canada	.9	2.1	3.6	4.0	3.3	2.9
OECD Pacific	.4	.8	1.3	1.6	1.4	1.3
Centrally Planned Eur.	5.3	8.4	9.7	10.1	9.1	8.0
Centrally Planned Asia	.0	.5	1.2	2.3	3.1	3.9
Middle East	1.4	1.9	3.1	2.4	1.8	1.6
Africa	.5	.7	.6	.4	.4	.6
Latin America	.5	.0	.0	.0	.0	.5
South and East Asia	.3	.5	.6	1.0	2.0	3.3
TOTAL	12.8	21.1	26.9	28.3	26.5	26.8

ELECTRICITY SOLIDS CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	15.7	16.2	22.6	21.4	22.3	25.0
OECD Europe-Canada	4.6	6.1	11.4	12.9	13.6	15.7
OECD Pacific	2.4	2.4	4.2	5.1	5.8	7.0
Centrally Planned Eur.	18.6	21.7	32.9	33.0	37.4	43.1
Centrally Planned Asia	3.6	4.6	5.9	7.3	12.4	21.1
Middle East	.0	.3	3.2	3.9	3.9	4.3
Africa	1.6	1.8	1.9	1.5	1.6	3.4
Latin America	.2	.0	.0	.0	.0	2.6
South and East Asia	1.7	2.0	2.5	3.2	8.0	17.5
TOTAL	48.4	55.1	84.6	88.3	105.0	139.7

ELECTRICITY HYDRO CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.3	3.8	4.3	4.6	4.7	4.8
OECD Europe-Canada	8.2	9.6	10.6	11.0	11.1	11.1
OECD Pacific	1.2	1.3	1.3	1.4	1.4	1.4
Centrally Planned Eur.	2.5	3.1	3.6	3.7	3.7	3.7
Centrally Planned Asia	1.0	2.3	6.4	10.0	11.3	11.6
Middle East	.1	.2	.4	.6	.7	.7
Africa	.2	.4	1.3	3.2	5.3	6.6
Latin America	3.3	6.0	9.7	13.7	19.3	20.6
South and East Asia	1.4	2.6	5.9	9.4	11.4	12.1
TOTAL	21.2	29.3	43.5	57.6	68.9	72.6

ENERGY REPORT: **2030 HIGH EMISSIONS - LOWER GROWTH**

ELECTRICITY NUCLEAR CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.5	4.4	6.7	6.2	7.3	8.4
OECD Europe-Canada	6.5	7.9	9.3	7.7	8.9	10.6
OECD Pacific	1.8	2.2	2.3	1.9	2.4	2.9
Centrally Planned Eur.	2.4	3.3	8.0	9.6	12.3	14.5
Centrally Planned Asia	.0	.0	1.3	2.1	4.1	7.1
Middle East	.0	.0	1.0	2.2	2.5	2.9
Africa	.0	.0	.3	.4	.5	1.1
Latin America	.0	.0	.0	.0	.0	.9
South and East Asia	.2	.2	.5	.9	2.6	5.9
TOTAL	14.4	18.0	29.4	31.0	40.6	54.3

ELECTRICITY SOLAR CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.5	1.9	2.9	3.4	3.9
OECD Europe-Canada	.0	.3	1.2	1.8	2.0	2.5
OECD Pacific	.0	.1	.4	.7	.9	1.1
Centrally Planned Eur.	.0	.5	2.6	4.5	5.7	6.8
Centrally Planned Asia	.0	.0	.4	1.0	1.9	3.3
Middle East	.0	.0	.4	1.0	1.1	1.3
Africa	.0	.0	.1	.2	.2	.5
Latin America	.0	.0	.0	.0	.0	.4
South and East Asia	.0	.0	.2	.4	1.2	2.8
TOTAL	.0	1.4	7.2	12.5	16.4	22.6

TOTAL ELECTRIC UTILITY ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	27.2	33.4	45.4	44.7	46.0	49.7
OECD Europe-Canada	21.6	27.9	38.2	39.3	40.6	44.6
OECD Pacific	7.1	7.9	10.3	11.5	12.6	14.5
Centrally Planned Eur.	33.2	42.0	61.8	65.7	73.0	81.1
Centrally Planned Asia	5.3	8.3	16.0	23.8	34.4	49.4
Middle East	2.7	3.5	9.6	11.3	11.0	11.8
Africa	2.7	3.3	4.5	5.9	8.2	12.6
Latin America	4.4	6.0	9.7	13.7	19.3	25.3
South and East Asia	4.2	6.0	10.1	15.4	26.2	43.6
TOTAL	108.4	138.3	205.6	231.3	271.3	332.6

TABLE A-18

ENERGY CONVERSION EFFICIENCY AT ELECTRIC UTILITY POWERPLANTS
(percent)

REGION	1985	2000	2025	2050	2075	2100
United States	32.0	33.2	34.6	35.8	37.8	38.0
OECD Europe-Canada	32.9	32.6	34.3	35.6	36.5	36.5
OECD Pacific	31.0	31.6	34.0	34.8	38.1	37.9
Centrally Planned Eur.	31.3	32.9	35.0	36.1	38.1	38.2
Centrally Planned Asia	28.3	31.3	32.5	34.5	36.9	37.4
Middle East	25.9	25.7	34.4	35.4	36.4	36.4
Africa	22.2	27.3	28.9	32.2	35.4	37.3
Latin America	29.5	33.3	33.0	33.6	33.2	34.0
South and East Asia	28.6	31.7	32.7	33.8	36.3	36.9

*Includes transmission and distribution losses

TABLE A-19

SYNTHETIC PRODUCTION OF OIL AND GAS

OIL FROM SYNFUELS
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.7	3.3	9.1	17.9
OECD Europe-Canada	.0	.0	.4	1.2	5.3	10.2
OECD Pacific	.0	.0	.2	.8	2.2	4.3
Centrally Planned Eur.	.0	.0	1.2	5.7	18.2	41.8
Centrally Planned Asia	.0	.0	.8	3.7	12.1	25.4
Middle East	.0	.0	.0	.0	.0	.0
Africa	.0	.0	.1	1.2	2.5	2.7
Latin America	.0	.0	.0	1.6	2.4	2.7
South and East Asia	.0	.0	.2	1.1	1.6	1.7
TOTAL	.0	.0	3.6	18.6	53.4	106.7

GAS FROM SYNFUELS
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.0	.9	1.7	4.0
OECD Europe-Canada	.0	.0	.0	.6	1.2	2.7
OECD Pacific	.0	.0	.0	.3	.6	1.3
Centrally Planned Eur.	.0	.0	.0	1.6	3.2	8.3
Centrally Planned Asia	.0	.0	.0	.8	1.6	4.5
Middle East	.0	.0	.0	.0	.0	.0
Africa	.0	.0	.0	2.1	3.6	6.4
Latin America	.0	.0	.0	3.1	5.3	9.1
South and East Asia	.0	.0	.0	1.4	2.4	4.1
TOTAL	.0	.0	.0	10.8	19.6	40.4

TABLE A-20

ENERGY USED FOR SYNTHETIC FUEL PRODUCTION BY TYPE

COAL USED IN SYNFUEL PRODUCTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	1.1	4.4	13.2	28.3
OECD Europe-Canada	.0	.0	.7	2.8	8.1	17.2
OECD Pacific	.0	.0	.2	1.0	3.1	6.7
Centrally Planned Eur.	.0	.0	1.8	7.4	26.4	66.5
Centrally Planned Asia	.0	.0	1.2	5.4	18.2	41.5
Middle East	.0	.0	.0	.0	.0	.0
Africa	.0	.0	.2	.8	2.6	6.9
Latin America	.0	.0	.0	.3	1.0	1.2
South and East Asia	.0	.0	.4	1.0	1.6	2.3
TOTAL	.0	.0	5.6	23.1	74.2	170.6

BIOMASS USED IN SYNFUEL PRODUCTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.0	1.7	2.7	4.1
OECD Europe-Canada	.0	.0	.0	1.2	1.9	2.9
OECD Pacific	.0	.0	.0	.6	1.0	1.5
Centrally Planned Eur.	.0	.0	.0	3.2	5.1	7.6
Centrally Planned Asia	.0	.0	.0	1.5	2.4	3.6
Middle East	.0	.0	.0	.0	.0	.1
Africa	.0	.0	.0	4.1	6.7	10.0
Latin America	.0	.0	.0	6.2	10.0	15.0
South and East Asia	.0	.0	.0	2.7	4.4	6.6
TOTAL	.0	.0	.0	21.2	34.2	51.4

TOTAL USED IN SYNFUEL PRODUCTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	1.1	6.1	15.9	32.4
OECD Europe-Canada	.0	.0	.7	4.0	10.0	20.1
OECD Pacific	.0	.0	.2	1.6	4.1	8.2
Centrally Planned Eur.	.0	.0	1.8	10.6	31.5	74.1
Centrally Planned Asia	.0	.0	1.2	6.9	20.6	45.1
Middle East	.0	.0	.0	.0	.0	.1
Africa	.0	.0	.2	4.9	9.3	16.9
Latin America	.0	.0	.0	6.5	11.0	16.2
South and East Asia	.0	.0	.4	3.7	6.0	8.9
TOTAL	.0	.0	5.6	44.3	108.4	222.0

TABLE A-21

CO2 EMISSIONS FROM FOSSIL FUEL
(Petagrams C/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	1.4	1.5	1.7	1.7	1.7	2.0
OECD Europe-Canada	.8	.9	1.1	1.2	1.2	1.4
OECD Pacific	.3	.3	.4	.4	.5	.6
Centrally Planned Eur.	1.4	1.7	2.3	2.4	2.7	3.2
Centrally Planned Asia	.5	.6	1.0	1.3	1.8	2.4
Middle East	.1	.2	.5	.5	.5	.5
Africa	.2	.2	.2	.2	.3	.4
Latin America	.2	.3	.4	.5	.5	.5
South and East Asia	.3	.3	.5	.6	1.0	1.5
TOTAL	5.2	6.0	8.1	8.9	10.1	12.5

TABLE A-22

CO EMISSIONS FROM FOSSIL FUEL
(Teragrams C/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	51.0	29.6	28.0	27.0	26.6	30.9
OECD Europe-Canada	39.0	33.9	38.2	38.1	37.5	44.4
OECD Pacific	13.5	11.6	12.2	12.8	13.7	17.2
Centrally Planned Eur.	35.1	54.1	91.4	89.7	88.4	97.6
Centrally Planned Asia	4.7	7.4	13.6	21.7	30.7	48.1
Middle East	4.2	5.8	16.2	19.0	18.2	21.8
Africa	8.1	11.3	16.3	17.6	18.6	23.3
Latin America	16.7	23.0	33.9	36.6	39.4	48.1
South and East Asia	10.2	13.7	19.4	27.8	40.2	63.9
TOTAL	182.5	190.3	268.9	290.3	313.4	395.1

TABLE A-23

NOX EMISSIONS FROM FOSSIL FUEL
(Teragrams N/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	6.4	6.2	6.0	5.6	5.5	6.1
OECD Europe-Canada	4.0	4.2	4.8	4.9	4.9	5.6
OECD Pacific	1.6	1.6	1.7	1.8	1.9	2.3
Centrally Planned Eur.	6.2	7.2	9.5	9.3	9.5	10.2
Centrally Planned Asia	2.0	2.8	4.2	5.6	6.9	8.6
Middle East	.5	.7	1.7	1.8	1.6	1.8
Africa	.8	1.0	1.2	1.5	1.7	2.3
Latin America	1.1	1.4	2.0	2.4	2.6	3.4
South and East Asia	1.2	1.5	2.1	3.0	4.5	6.9
TOTAL	23.8	26.5	33.3	35.9	39.2	47.2

TABLE A-24

PRIMARY ENERGY SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	66.8	63.4	86.6	125.8	218.6	349.2
OECD Europe-Canada	47.2	52.4	74.4	92.5	112.0	127.8
OECD Pacific	8.8	12.4	18.1	26.8	46.5	75.1
Centrally Planned Eur.	80.1	99.2	168.1	287.2	481.9	552.1
Centrally Planned Asia	26.7	37.6	91.4	184.0	221.0	254.1
Middle East	24.9	55.4	80.3	88.9	65.5	51.0
Africa	17.2	26.7	48.0	67.3	68.9	76.2
Latin America	21.2	26.0	59.2	97.4	98.1	93.1
South and East Asia	21.7	21.3	30.9	45.7	73.2	103.3
TOTAL	314.6	394.4	657.0	1015.6	1385.7	1681.9

TABLE A-25

PRIMARY OIL SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	22.7	12.8	9.2	11.9	20.5	29.3
OECD Europe-Canada	12.4	10.1	8.6	6.3	3.9	2.3
OECD Pacific	1.2	.6	.2	.1	.2	.2
Centrally Planned Eur.	26.5	22.8	18.4	12.8	8.8	6.6
Centrally Planned Asia	5.4	7.0	7.2	5.2	4.1	3.7
Middle East	23.3	50.9	57.8	45.5	29.5	18.5
Africa	11.3	17.8	22.2	18.6	13.3	9.8
Latin America	14.7	12.3	26.5	44.2	31.4	18.7
South and East Asia	11.1	6.2	3.6	2.7	2.4	2.4
TOTAL	128.6	140.5	153.7	147.3	114.1	91.5

TABLE A-26

PRIMARY GAS SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	17.2	16.1	12.6	9.1	6.4	2.3
OECD Europe-Canada	9.6	9.6	12.1	10.1	4.7	3.1
OECD Pacific	.7	1.8	1.7	1.1	.5	.3
Centrally Planned Eur.	23.4	31.1	34.1	24.3	11.1	5.3
Centrally Planned Asia	.5	2.2	4.7	4.2	2.0	1.0
Middle East	1.5	4.3	19.7	33.8	19.3	10.3
Africa	1.7	3.3	6.5	8.6	5.4	3.2
Latin America	2.6	5.7	9.9	7.9	4.3	2.0
South and East Asia	2.9	2.7	4.2	3.0	1.8	.9
TOTAL	60.1	76.8	105.5	102.1	55.5	28.4

TABLE A-27

PRIMARY COAL SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	19.7	25.0	47.6	80.8	162.4	287.8
OECD Europe-Canada	10.3	13.2	25.6	43.3	64.8	82.6
OECD Pacific	3.9	5.7	10.7	18.1	35.7	63.3
Centrally Planned Eur.	25.1	37.7	96.9	213.5	411.2	483.5
Centrally Planned Asia	19.8	25.9	66.8	143.0	156.9	168.4
Middle East	.0	.0	.0	.0	.0	.0
Africa	4.0	5.2	14.5	22.5	20.1	23.5
Latin America	.6	1.1	3.4	4.2	3.9	4.6
South and East Asia	6.1	9.3	11.3	8.3	9.3	12.8
TOTAL	89.5	123.1	276.8	533.7	864.3	1126.5

TABLE A-28

PRIMARY BIOMASS SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.7	3.7	5.5	5.7
OECD Europe-Canada	.0	.0	.5	2.7	3.9	4.1
OECD Pacific	.0	.0	.3	1.3	2.0	2.0
Centrally Planned Eur.	.0	.0	1.4	7.0	10.2	10.7
Centrally Planned Asia	.0	.0	.6	3.3	4.8	5.0
Middle East	.0	.0	.0	.0	.1	.2
Africa	.0	.0	1.8	9.1	13.4	14.0
Latin America	.0	.0	2.7	13.6	20.1	21.0
South and East Asia	.0	.0	1.2	6.0	8.8	9.2
TOTAL	.0	.0	9.2	46.7	68.8	71.9

TABLE A-29

PRIMARY HYDROELECTRIC SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.3	3.8	4.3	4.6	4.7	4.8
OECD Europe-Canada	8.2	9.6	10.6	11.0	11.1	11.1
OECD Pacific	1.2	1.3	1.3	1.4	1.4	1.4
Centrally Planned Eur.	2.5	3.1	3.6	3.7	3.7	3.7
Centrally Planned Asia	1.0	2.3	6.4	10.0	11.3	11.6
Middle East	.1	.2	.4	.6	.7	.7
Africa	.2	.4	1.3	3.2	5.3	6.6
Latin America	3.3	6.9	14.9	19.2	20.4	20.6
South and East Asia	1.4	2.6	5.9	9.4	11.4	12.1
TOTAL	21.2	30.2	48.7	63.1	70.0	72.6

TABLE A-30

PRIMARY NUCLEAR SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.9	5.2	9.5	10.6	12.7	12.2
OECD Europe-Canada	6.7	9.6	15.1	15.4	18.9	19.1
OECD Pacific	1.8	2.9	3.3	3.5	4.8	5.4
Centrally Planned Eur.	2.6	3.9	10.4	17.5	24.6	26.8
Centrally Planned Asia	.0	.1	4.3	12.4	27.9	40.8
Middle East	.0	.0	1.7	6.1	10.6	13.5
Africa	.0	.0	1.2	3.6	7.6	12.1
Latin America	.0	.0	1.3	5.6	12.0	16.6
South and East Asia	.2	.5	3.5	11.0	26.3	41.8
TOTAL	15.2	22.2	50.3	85.7	145.4	188.3

TABLE A-31

PRIMARY SOLAR SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.5	2.7	5.1	6.4	7.1
OECD Europe-Canada	.0	.3	1.9	3.7	4.7	5.5
OECD Pacific	.0	.1	.6	1.3	1.9	2.5
Centrally Planned Eur.	.0	.6	3.3	8.4	12.3	15.5
Centrally Planned Asia	.0	.1	1.4	5.9	14.0	23.6
Middle East	.0	.0	.7	2.9	5.3	7.8
Africa	.0	.0	.5	1.7	3.8	7.0
Latin America	.0	.0	.5	2.7	6.0	9.6
South and East Asia	.0	.0	1.2	5.3	13.2	24.1
TOTAL	.0	1.6	12.8	37.0	67.6	102.7

TABLE A-32

PRIMARY ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	77.2	91.7	111.2	125.9	140.7	160.1
OECD Europe-Canada	58.3	70.0	91.7	106.5	114.0	117.7
OECD Pacific	17.6	21.6	24.9	32.6	40.1	48.8
Centrally Planned Eur.	72.7	97.9	143.2	204.5	265.6	299.9
Centrally Planned Asia	19.2	34.9	87.9	174.3	267.3	335.9
Middle East	8.5	13.0	34.4	57.9	78.2	92.0
Africa	7.2	12.8	31.6	61.2	90.0	120.0
Latin America	15.9	27.9	65.8	115.1	156.1	182.5
South and East Asia	13.9	26.0	66.4	138.0	233.5	324.8
TOTAL	290.5	395.8	657.1	1016.0	1385.5	1681.7

TABLE A-33

SECONDARY ENERGY CONSUMPTION: FUEL VERSUS ELECTRICITY

FUEL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	50.1	53.9	51.2	52.5	48.7	46.7
OECD Europe-Canada	36.9	38.8	38.1	39.5	36.8	36.2
OECD Pacific	10.7	11.8	10.7	12.9	13.3	14.2
Centrally Planned Eur.	39.6	50.3	66.1	80.1	80.8	83.1
Centrally Planned Asia	13.8	23.1	48.9	79.9	94.1	96.8
Middle East	5.6	8.5	21.0	32.4	39.2	43.2
Africa	4.5	8.0	18.7	30.7	38.8	44.2
Latin America	11.5	19.4	41.3	61.2	70.8	75.8
South and East Asia	9.6	16.7	35.3	64.2	87.9	105.7
TOTAL	182.3	230.5	331.3	453.4	510.4	545.9

ELECTRICITY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	8.6	12.4	20.0	23.4	25.5	23.9
OECD Europe-Canada	7.0	10.4	18.0	22.1	24.5	24.4
OECD Pacific	2.2	3.2	4.7	6.5	8.0	8.8
Centrally Planned Eur.	10.4	15.5	25.2	37.4	47.3	50.2
Centrally Planned Asia	1.5	3.4	11.9	28.8	56.2	78.6
Middle East	.8	1.4	4.6	9.2	14.4	18.1
Africa	.7	1.5	3.8	8.4	16.1	24.2
Latin America	1.4	2.8	7.9	17.8	29.2	37.1
South and East Asia	1.2	2.8	10.0	25.9	53.2	80.5
TOTAL	33.8	53.4	106.1	179.5	274.4	345.8

TOTAL ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	58.7	66.3	71.2	75.9	74.2	70.6
OECD Europe-Canada	43.9	49.2	56.1	61.6	61.3	60.6
OECD Pacific	12.9	15.0	15.4	19.4	21.3	23.0
Centrally Planned Eur.	50.0	65.8	91.3	117.5	128.1	133.3
Centrally Planned Asia	15.3	26.5	60.8	108.7	150.3	175.4
Middle East	6.4	9.9	25.6	41.6	53.6	61.3
Africa	5.2	9.5	22.5	39.1	54.9	68.4
Latin America	12.9	22.2	49.2	79.0	100.0	112.9
South and East Asia	10.8	19.5	45.3	90.1	141.1	186.2
TOTAL	216.1	283.9	437.4	632.9	784.8	891.7

TABLE A-34

SECONDARY OIL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	31.6	32.1	25.2	26.8	25.9	26.9
OECD Europe-Canada	25.3	25.3	21.4	22.8	22.0	23.5
OECD Pacific	8.1	8.4	6.8	8.6	9.0	10.2
Centrally Planned Eur.	16.0	19.7	25.3	33.6	36.5	42.5
Centrally Planned Asia	3.0	4.1	7.7	16.0	26.2	41.3
Middle East	4.8	7.0	15.4	24.2	30.1	33.7
Africa	2.8	4.7	10.4	16.1	19.7	24.0
Latin America	9.1	14.4	26.0	39.7	48.1	54.5
South and East Asia	5.9	8.9	13.4	26.2	41.2	60.2
TOTAL	106.6	124.6	151.6	214.0	258.7	316.8

TABLE A-35

SECONDARY GAS CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	14.7	16.0	17.9	16.7	14.7	13.1
OECD Europe-Canada	7.1	7.4	8.6	8.0	7.0	6.2
OECD Pacific	.8	1.0	1.0	.9	.9	.9
Centrally Planned Eur.	14.1	20.6	28.7	32.8	30.6	31.4
Centrally Planned Asia	.1	.3	.5	.8	1.3	1.7
Middle East	.8	1.5	5.6	8.1	9.0	9.4
Africa	.5	.8	1.5	2.3	3.2	4.3
Latin America	1.8	3.5	10.1	14.0	15.6	16.0
South and East Asia	1.0	1.9	4.6	8.1	11.8	15.0
TOTAL	40.9	53.0	78.5	91.7	94.1	98.0

TABLE A-36

SECONDARY SOLIDS CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.8	5.8	8.1	9.0	8.1	6.7
OECD Europe-Canada	4.5	6.1	8.1	8.7	7.8	6.5
OECD Pacific	1.8	2.4	2.9	3.4	3.4	3.1
Centrally Planned Eur.	9.5	10.0	12.1	13.7	13.7	9.2
Centrally Planned Asia	10.7	18.7	40.7	63.1	66.6	53.8
Middle East	.0	.0	.0	.1	.1	.1
Africa	1.2	2.5	6.8	12.3	15.9	15.9
Latin America	.6	1.5	5.2	7.5	7.1	5.3
South and East Asia	2.7	5.9	17.3	29.9	34.9	30.5
TOTAL	34.8	52.9	101.2	147.7	157.6	131.1

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TABLE A-37

RESIDENTIAL/COMMERCIAL ENERGY CONSUMPTION: FUEL VERSUS ELECTRICITY

FUEL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	11.4	11.1	11.8	11.0	9.4	8.1
OECD Europe-Canada	11.0	10.8	12.6	11.4	9.5	7.8
OECD Pacific	1.5	1.6	1.7	1.8	1.8	1.7
Centrally Planned Eur.	14.7	17.4	25.3	29.7	29.6	27.6
Centrally Planned Asia	3.4	4.8	7.4	14.0	18.8	19.1
Middle East	.3	.6	1.8	3.1	4.2	4.9
Africa	.4	.8	1.9	3.5	4.7	5.4
Latin America	1.6	2.4	3.8	6.3	8.2	9.0
South and East Asia	2.0	3.0	5.0	9.3	13.1	15.0
TOTAL	46.3	52.5	71.3	90.1	99.3	98.6

ELECTRICITY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	5.7	8.4	14.7	16.5	17.1	15.5
OECD Europe-Canada	3.9	5.7	11.0	12.5	12.8	11.6
OECD Pacific	1.1	1.6	2.6	3.5	4.1	4.4
Centrally Planned Eur.	2.9	4.4	8.9	12.6	15.2	15.2
Centrally Planned Asia	.2	.4	1.6	4.4	9.8	15.8
Middle East	.2	.3	1.3	2.8	4.9	6.9
Africa	.3	.6	1.6	3.5	6.6	9.8
Latin America	.5	1.0	2.3	5.4	9.5	13.1
South and East Asia	.4	1.0	3.5	9.0	18.4	28.5
TOTAL	15.2	23.4	47.5	70.2	98.4	120.8

TOTAL ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	17.1	19.5	26.5	27.5	26.5	23.6
OECD Europe-Canada	14.9	16.5	23.6	23.9	22.3	19.4
OECD Pacific	2.6	3.2	4.3	5.3	5.9	6.1
Centrally Planned Eur.	17.6	21.8	34.2	42.3	44.8	42.8
Centrally Planned Asia	3.6	5.2	9.0	18.4	28.6	34.9
Middle East	.5	.9	3.1	5.9	9.1	11.8
Africa	.7	1.4	3.5	7.0	11.3	15.2
Latin America	2.1	3.4	6.1	11.7	17.7	22.1
South and East Asia	2.4	4.0	8.5	18.3	31.5	43.5
TOTAL	61.5	75.9	118.8	160.3	197.7	219.4

TABLE A-38

INDUSTRIAL ENERGY CONSUMPTION: FUEL VERSUS ELECTRICITY

FUEL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	17.6	20.5	21.0	21.0	19.2	16.6
OECD Europe-Canada	12.3	13.1	11.6	11.9	11.1	9.8
OECD Pacific	4.6	4.9	4.0	4.9	4.9	4.5
Centrally Planned Eur.	16.1	18.4	19.4	21.0	18.7	16.2
Centrally Planned Asia	9.4	16.5	36.8	54.7	55.4	42.6
Middle East	4.2	6.3	15.3	22.1	24.6	22.8
Africa	2.0	3.4	7.3	12.7	16.6	17.4
Latin America	5.6	10.1	24.1	32.3	33.7	28.9
South and East Asia	5.0	9.7	23.2	39.1	48.1	45.9
TOTAL	76.8	102.9	162.7	219.7	232.3	204.7

ELECTRICITY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	2.9	4.0	5.3	6.9	8.4	8.4
OECD Europe-Canada	3.0	4.5	6.7	9.2	11.3	12.2
OECD Pacific	1.1	1.6	2.1	3.0	3.9	4.4
Centrally Planned Eur.	7.4	11.0	16.2	24.6	31.9	34.7
Centrally Planned Asia	1.3	3.0	10.2	24.0	45.6	61.2
Middle East	.6	1.1	3.3	6.4	9.5	11.2
Africa	.4	.9	2.2	4.9	9.5	14.4
Latin America	.9	1.8	5.6	12.4	19.7	23.9
South and East Asia	.8	1.8	6.5	16.7	34.4	51.2
TOTAL	18.4	29.7	58.1	108.1	174.2	221.6

TOTAL ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	20.5	24.5	26.3	27.9	27.6	25.0
OECD Europe-Canada	15.3	17.6	18.3	21.1	22.4	22.0
OECD Pacific	5.7	6.5	6.1	7.9	8.8	8.9
Centrally Planned Eur.	23.5	29.4	35.6	45.6	50.6	50.9
Centrally Planned Asia	10.7	19.5	47.0	78.7	101.0	103.8
Middle East	4.8	7.4	18.6	28.5	34.1	34.0
Africa	2.4	4.3	9.5	17.6	26.1	31.8
Latin America	6.5	11.9	29.7	44.7	53.4	52.8
South and East Asia	5.8	11.5	29.7	55.8	82.5	97.1
TOTAL	95.2	132.6	220.8	327.8	406.5	426.3

TABLE A-39

TRANSPORTATION ENERGY CONSUMPTION: FUEL VERSUS ELECTRICITY

FUEL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	21.1	22.3	18.4	20.5	20.1	22.0
OECD Europe-Canada	13.6	14.9	13.9	16.2	16.2	18.6
OECD Pacific	4.6	5.3	5.0	6.2	6.6	8.0
Centrally Planned Eur.	8.8	14.5	21.4	29.4	32.5	39.3
Centrally Planned Asia	1.0	1.8	4.7	11.2	19.9	35.1
Middle East	1.1	1.6	3.9	7.2	10.4	15.5
Africa	2.1	3.8	9.5	14.5	17.5	21.4
Latin America	4.3	6.9	13.4	22.6	28.9	37.9
South and East Asia	2.6	4.0	7.1	15.8	26.7	44.8
TOTAL	59.2	75.1	97.3	143.6	178.8	242.6

ELECTRICITY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.0	.0	.0	.0
OECD Europe-Canada	.1	.2	.3	.4	.4	.6
OECD Pacific	.0	.0	.0	.0	.0	.0
Centrally Planned Eur.	.1	.1	.1	.2	.2	.3
Centrally Planned Asia	.0	.0	.1	.4	.8	1.6
Middle East	.0	.0	.0	.0	.0	.0
Africa	.0	.0	.0	.0	.0	.0
Latin America	.0	.0	.0	.0	.0	.1
South and East Asia	.0	.0	.0	.2	.4	.8
TOTAL	.2	.3	.5	1.2	1.8	3.4

TOTAL ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	21.1	22.3	18.4	20.5	20.1	22.0
OECD Europe-Canada	13.7	15.1	14.2	16.6	16.6	19.2
OECD Pacific	4.6	5.3	5.0	6.2	6.6	8.0
Centrally Planned Eur.	8.9	14.6	21.5	29.6	32.7	39.6
Centrally Planned Asia	1.0	1.8	4.8	11.6	20.7	36.7
Middle East	1.1	1.6	3.9	7.2	10.4	15.5
Africa	2.1	3.8	9.5	14.5	17.5	21.4
Latin America	4.3	6.9	13.4	22.6	28.9	38.0
South and East Asia	2.6	4.0	7.1	16.0	27.1	45.6
TOTAL	59.4	75.4	97.8	144.8	180.6	246.0

TABLE A-40

ELECTRIC UTILITY ENERGY CONSUMPTION

ELECTRICITY OIL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	1.3	2.5	3.5	4.2	4.3	4.0
OECD Europe-Canada	1.5	2.0	2.6	3.1	3.2	3.1
OECD Pacific	1.4	1.3	1.0	1.1	1.3	1.4
Centrally Planned Eur.	4.9	5.3	5.1	6.9	8.4	8.8
Centrally Planned Asia	.8	1.3	2.2	4.9	9.5	13.4
Middle East	1.2	1.4	1.9	2.5	3.6	4.4
Africa	.4	.6	.8	1.4	2.6	3.9
Latin America	.4	.4	.9	2.2	4.1	5.4
South and East Asia	.7	1.2	2.1	4.4	9.0	13.7
TOTAL	12.6	16.0	20.1	30.7	46.0	58.1

ELECTRICITY GAS CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.9	6.5	6.9	6.5	5.7	5.1
OECD Europe-Canada	.9	2.2	4.2	4.7	4.2	3.9
OECD Pacific	.4	.9	1.4	1.7	1.7	1.8
Centrally Planned Eur.	5.9	8.9	9.1	10.8	10.9	11.1
Centrally Planned Asia	.0	.7	3.0	7.7	12.4	16.9
Middle East	1.5	2.4	3.7	3.8	4.7	5.6
Africa	.5	.9	1.4	2.2	3.4	5.0
Latin America	.5	.7	1.7	3.5	5.4	6.8
South and East Asia	.3	.9	2.9	6.9	11.7	17.2
TOTAL	13.9	24.1	34.3	47.8	60.1	73.4

ELECTRICITY SOLIDS CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	14.7	19.2	31.2	33.7	33.9	30.3
OECD Europe-Canada	4.0	7.5	18.0	24.1	25.1	23.7
OECD Pacific	2.0	3.2	6.1	8.7	10.2	10.8
Centrally Planned Eur.	17.3	25.7	41.8	54.5	64.9	66.4
Centrally Planned Asia	3.5	7.3	19.1	38.4	73.6	101.2
Middle East	.0	.4	5.1	9.6	14.1	16.7
Africa	1.5	2.8	6.4	11.2	20.1	29.9
Latin America	.1	.4	4.3	16.6	31.7	41.1
South and East Asia	1.6	4.1	14.9	34.0	69.4	103.6
TOTAL	44.7	70.6	146.9	230.8	343.0	423.7

ELECTRICITY HYDRO CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.3	3.8	4.3	4.6	4.7	4.8
OECD Europe-Canada	8.2	9.6	10.6	11.0	11.1	11.1
OECD Pacific	1.2	1.3	1.3	1.4	1.4	1.4
Centrally Planned Eur.	2.5	3.1	3.6	3.7	3.7	3.7
Centrally Planned Asia	1.0	2.3	6.4	10.0	11.3	11.6
Middle East	.1	.2	.4	.6	.7	.7
Africa	.2	.4	1.3	3.2	5.3	6.6
Latin America	3.3	6.9	14.9	19.2	20.4	20.6
South and East Asia	1.4	2.6	5.9	9.4	11.4	12.1
TOTAL	21.2	30.2	48.7	63.1	70.0	72.6

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ELECTRICITY NUCLEAR CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.9	5.2	9.5	10.6	12.7	12.2
OECD Europe-Canada	6.7	9.6	15.1	15.4	18.9	19.1
OECD Pacific	1.8	2.9	3.3	3.5	4.8	5.4
Centrally Planned Eur.	2.6	3.9	10.4	17.5	24.6	26.8
Centrally Planned Asia	.0	.1	4.3	12.4	27.9	40.8
Middle East	.0	.0	1.7	6.1	10.6	13.5
Africa	.0	.0	1.2	3.6	7.6	12.1
Latin America	.0	.0	1.3	5.6	12.0	16.6
South and East Asia	.2	.5	3.5	11.0	26.3	41.8
TOTAL	15.2	22.2	50.3	85.7	145.4	188.3

ELECTRICITY SOLAR CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.5	2.7	5.1	6.4	7.1
OECD Europe-Canada	.0	.3	1.9	3.7	4.7	5.5
OECD Pacific	.0	.1	.6	1.3	1.9	2.5
Centrally Planned Eur.	.0	.6	3.3	8.4	12.3	15.5
Centrally Planned Asia	.0	.1	1.4	5.9	14.0	23.6
Middle East	.0	.0	.7	2.9	5.3	7.8
Africa	.0	.0	.5	1.7	3.8	7.0
Latin America	.0	.0	.5	2.7	6.0	9.6
South and East Asia	.0	.0	1.2	5.3	13.2	24.1
TOTAL	.0	1.6	12.8	37.0	67.6	102.7

TOTAL ELECTRIC UTILITY ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	27.1	37.7	58.1	64.7	67.7	63.5
OECD Europe-Canada	21.3	31.2	52.4	62.0	67.2	66.4
OECD Pacific	6.8	9.7	13.7	17.7	21.3	23.3
Centrally Planned Eur.	33.2	47.5	73.3	101.8	124.8	132.3
Centrally Planned Asia	5.3	11.8	36.4	79.3	148.7	207.5
Middle East	2.8	4.4	13.5	25.5	39.0	48.7
Africa	2.6	4.7	11.6	23.3	42.8	64.5
Latin America	4.3	8.4	23.6	49.8	79.6	100.1
South and East Asia	4.2	9.3	30.5	71.0	141.0	212.5
TOTAL	07.6	164.7	313.1	495.1	732.1	918.8

TABLE A-41

ENERGY CONVERSION EFFICIENCY AT ELECTRIC UTILITY POWERPLANTS

(percent)

REGION	1985	2000	2025	2050	2075	2100
United States	31.7	32.6	34.4	36.2	37.5	38.0
OECD Europe-Canada	32.4	33.3	34.0	35.5	36.6	36.6
OECD Pacific	30.9	32.0	34.3	36.7	37.6	37.3
Centrally Planned Eur.	31.6	32.4	34.4	36.6	38.0	37.9
Centrally Planned Asia	26.4	28.8	32.4	36.3	37.8	37.9
Middle East	25.0	29.5	34.8	36.1	37.2	37.2
Africa	23.1	29.8	32.8	36.5	37.6	37.4
Latin America	30.2	32.1	33.5	35.9	36.9	37.2
South and East Asia	26.2	30.1	33.4	36.6	37.8	37.8

*Includes transmission and distribution losses

TABLE A-42

SYNTHETIC PRODUCTION OF OIL AND GAS

OIL FROM SYNFUELS

(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	3.2	14.9	36.2	73.4
OECD Europe-Canada	.0	.0	1.8	8.1	14.6	21.3
OECD Pacific	.0	.0	.7	3.4	8.0	16.2
Centrally Planned Eur.	.0	.0	6.6	39.0	91.5	123.5
Centrally Planned Asia	.0	.0	4.5	25.6	33.7	41.1
Middle East	.0	.0	.0	.0	.0	.0
Africa	.0	.0	.7	2.3	3.2	3.5
Latin America	.0	.0	.2	2.0	2.0	2.4
South and East Asia	.0	.0	.7	1.6	1.5	2.1
TOTAL	.0	.0	18.4	96.9	190.7	283.5

GAS FROM SYNFUELS

(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.6	3.6	13.4	28.2
OECD Europe-Canada	.0	.0	.4	2.3	6.5	9.7
OECD Pacific	.0	.0	.2	1.1	3.5	6.7
Centrally Planned Eur.	.0	.0	1.1	7.6	31.5	48.1
Centrally Planned Asia	.0	.0	.6	4.2	12.6	17.6
Middle East	.0	.0	.0	.0	.0	.1
Africa	.0	.0	1.3	6.0	10.3	11.2
Latin America	.0	.0	2.0	8.6	13.8	14.2
South and East Asia	.0	.0	.9	3.9	6.5	7.2
TOTAL	.0	.0	7.1	37.3	98.1	143.0

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TABLE A-43

ENERGY USED FOR SYNTHETIC FUEL PRODUCTION BY TYPE

COAL USED IN SYNFUEL PRODUCTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	5.0	23.5	68.3	146.0
OECD Europe-Canada	.0	.0	2.7	12.6	27.3	41.9
OECD Pacific	.0	.0	1.1	5.2	15.0	32.1
Centrally Planned Eur.	.0	.0	10.1	62.1	172.9	245.3
Centrally Planned Asia	.0	.0	7.0	41.6	66.0	85.4
Middle East	.0	.0	.0	.0	.0	.0
Africa	.0	.0	1.5	6.5	8.5	11.9
Latin America	.0	.0	.4	1.2	1.6	2.3
South and East Asia	.0	.0	1.2	2.4	3.9	6.5
TOTAL	.0	.0	29.0	155.1	363.5	571.4

BIOMASS USED IN SYNFUEL PRODUCTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.7	3.7	5.5	5.7
OECD Europe-Canada	.0	.0	.5	2.7	3.9	4.1
OECD Pacific	.0	.0	.3	1.3	2.0	2.0
Centrally Planned Eur.	.0	.0	1.4	7.0	10.2	10.7
Centrally Planned Asia	.0	.0	.6	3.3	4.8	5.0
Middle East	.0	.0	.0	.0	.1	.2
Africa	.0	.0	1.8	9.1	13.4	14.0
Latin America	.0	.0	2.7	13.6	20.1	21.0
South and East Asia	.0	.0	1.2	6.0	8.8	9.2
TOTAL	.0	.0	9.2	46.7	68.8	71.9

TOTAL USED IN SYNFUEL PRODUCTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	5.7	27.2	73.8	151.7
OECD Europe-Canada	.0	.0	3.2	15.3	31.2	46.0
OECD Pacific	.0	.0	1.4	6.5	17.0	34.1
Centrally Planned Eur.	.0	.0	11.5	69.1	183.1	256.0
Centrally Planned Asia	.0	.0	7.6	44.9	70.8	90.4
Middle East	.0	.0	.0	.0	.1	.2
Africa	.0	.0	3.3	15.6	21.9	25.9
Latin America	.0	.0	3.1	14.8	21.7	23.3
South and East Asia	.0	.0	2.4	8.4	12.7	15.7
TOTAL	.0	.0	38.2	201.8	432.3	643.3

ENERGY REPORT: 2030 HIGH EMISSIONS - HIGHER GROWTH

TABLE A-44

CO2 EMISSIONS FROM FOSSIL FUEL
(Petagrams C/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	1.3	1.6	2.0	2.4	2.9	3.8
OECD Europe-Canada	.8	1.0	1.3	1.7	1.8	2.0
OECD Pacific	.3	.4	.4	.6	.8	1.0
Centrally Planned Eur.	1.4	1.8	2.7	3.9	5.6	6.6
Centrally Planned Asia	.5	.8	2.0	3.8	5.5	6.5
Middle East	.1	.2	.6	.9	1.2	1.3
Africa	.1	.3	.6	1.0	1.4	1.8
Latin America	.2	.3	.9	1.6	2.1	2.4
South and East Asia	.3	.5	1.2	2.4	4.0	5.3
TOTAL	5.1	6.9	11.7	18.2	25.3	30.8

TABLE A-45

CO EMISSIONS FROM FOSSIL FUEL
(Teragrams C/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	51.0	29.5	24.7	27.7	27.4	30.1
OECD Europe-Canada	39.0	34.0	31.9	37.1	37.3	42.5
OECD Pacific	13.2	12.1	11.4	14.1	15.1	18.3
Centrally Planned Eur.	35.0	57.2	84.7	115.9	128.6	155.1
Centrally Planned Asia	4.7	8.8	21.7	49.2	84.3	142.8
Middle East	4.2	6.4	15.4	28.6	40.9	60.8
Africa	8.1	15.1	37.5	57.5	69.4	84.7
Latin America	16.7	27.1	52.6	88.7	113.9	148.6
South and East Asia	10.2	15.9	29.1	64.4	107.4	177.6
TOTAL	182.0	206.2	309.1	483.2	624.2	860.5

TABLE A-46

NOX EMISSIONS FROM FOSSIL FUEL
(Teragrams N/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	6.3	6.4	6.5	6.9	7.1	7.6
OECD Europe-Canada	3.9	4.3	5.0	5.9	6.1	6.3
OECD Pacific	1.5	1.7	1.8	2.2	2.6	2.9
Centrally Planned Eur.	6.1	7.7	9.8	12.5	15.0	16.3
Centrally Planned Asia	2.0	3.6	7.9	13.8	19.4	22.7
Middle East	.5	.8	1.9	3.1	4.2	5.2
Africa	.8	1.4	3.1	5.2	7.1	8.8
Latin America	1.1	1.8	4.0	7.3	9.9	12.0
South and East Asia	1.1	2.2	5.0	9.9	15.9	21.8
TOTAL	23.2	29.9	44.9	66.9	87.3	103.6

TABLE A-47

PRIMARY ENERGY SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	66.8	53.9	47.1	42.7	44.2	50.3
OECD Europe-Canada	47.4	44.6	50.0	47.2	42.6	44.1
OECD Pacific	8.9	9.5	9.5	9.3	10.1	12.4
Centrally Planned Eur.	80.1	82.5	89.7	79.2	74.9	89.8
Centrally Planned Asia	26.7	28.5	42.4	53.5	60.0	72.4
Middle East	24.9	44.2	63.2	58.2	53.0	46.6
Africa	17.2	21.2	26.2	33.9	34.2	33.2
Latin America	21.2	21.7	26.8	37.9	47.2	53.9
South and East Asia	21.7	15.9	18.6	26.1	27.5	29.1
TOTAL	314.9	322.0	373.5	388.0	393.7	431.8

TABLE A-48

PRIMARY OIL SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	22.7	12.2	5.7	4.6	5.1	5.2
OECD Europe-Canada	12.4	9.0	7.1	6.0	4.2	2.7
OECD Pacific	1.2	.6	.2	.0	.0	.0
Centrally Planned Eur.	26.5	20.7	16.3	12.5	8.2	5.2
Centrally Planned Asia	5.4	6.4	6.0	5.3	3.6	2.1
Middle East	23.3	41.1	52.5	41.5	29.0	18.9
Africa	11.3	15.2	17.0	17.4	12.5	8.5
Latin America	14.7	10.5	9.4	15.3	21.3	23.6
South and East Asia	11.1	5.8	2.8	2.1	1.5	1.2
TOTAL	128.6	121.5	117.0	104.7	85.4	67.4

TABLE A-49

PRIMARY GAS SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	17.2	16.5	13.2	10.6	5.8	2.5
OECD Europe-Canada	9.6	9.6	12.8	11.2	6.0	2.6
OECD Pacific	.7	1.5	1.8	1.3	.7	.3
Centrally Planned Eur.	23.4	29.9	34.7	25.8	12.4	5.1
Centrally Planned Asia	.5	1.4	3.5	5.1	3.0	1.4
Middle East	1.5	2.9	9.3	14.2	21.3	24.8
Africa	1.7	2.6	4.7	7.6	8.1	4.4
Latin America	2.6	4.9	8.8	8.1	5.2	2.5
South and East Asia	2.9	2.0	2.8	3.5	2.9	1.4
TOTAL	60.1	71.3	91.6	87.4	65.4	45.0

TABLE A-50

PRIMARY COAL SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	19.7	17.1	17.8	16.2	20.4	27.7
OECD Europe-Canada	10.3	9.4	11.7	12.0	13.4	18.3
OECD Pacific	3.9	4.0	4.4	4.7	5.6	7.6
Centrally Planned Eur.	25.1	25.3	27.7	26.5	36.4	58.1
Centrally Planned Asia	19.8	18.4	25.2	30.3	37.3	49.5
Middle East	.0	.0	.0	.0	.0	.0
Africa	4.0	3.0	3.0	3.3	4.0	6.6
Latin America	.6	.9	1.2	1.7	2.2	2.8
South and East Asia	6.1	5.3	6.8	9.1	7.2	5.8
TOTAL	89.5	83.4	97.8	103.8	126.5	176.4

TABLE A-51

PRIMARY BIOMASS SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.0	.9	1.8	2.9
OECD Europe-Canada	.0	.0	.0	.7	1.3	2.0
OECD Pacific	.0	.0	.0	.3	.6	1.0
Centrally Planned Eur.	.0	.0	.0	1.8	3.4	5.4
Centrally Planned Asia	.0	.0	.0	.8	1.6	2.5
Middle East	.0	.0	.0	.0	.0	.0
Africa	.0	.0	.0	2.3	4.4	7.0
Latin America	.0	.0	.0	3.4	6.6	10.5
South and East Asia	.0	.0	.0	1.5	2.9	4.6
TOTAL	.0	.0	.0	11.7	22.6	35.9

TABLE A-52

PRIMARY HYDROELECTRIC SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.3	3.8	4.3	4.6	4.7	4.8
OECD Europe-Canada	8.2	9.6	10.6	11.0	11.1	11.1
OECD Pacific	1.2	1.3	1.3	1.4	1.4	1.4
Centrally Planned Eur.	2.5	3.1	3.6	3.7	3.7	3.7
Centrally Planned Asia	1.0	2.3	6.4	10.0	11.3	11.8
Middle East	.1	.2	.4	.6	.7	.7
Africa	.2	.4	1.3	3.2	5.2	6.6
Latin America	3.3	5.4	7.4	9.4	11.9	14.5
South and East Asia	1.4	2.6	5.9	9.4	11.4	12.1
TOTAL	21.2	28.7	41.2	53.3	61.4	66.5

TABLE A-53

PRIMARY NUCLEAR SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.9	3.9	4.8	4.0	4.4	4.9
OECD Europe-Canada	6.9	6.8	6.9	5.1	5.4	6.0
OECD Pacific	1.9	2.0	1.5	1.2	1.3	1.5
Centrally Planned Eur.	2.6	3.0	5.6	6.1	7.4	8.4
Centrally Planned Asia	.0	.0	1.0	1.4	2.2	3.6
Middle East	.0	.0	.7	1.3	1.4	1.5
Africa	.0	.0	.2	.1	.0	.1
Latin America	.0	.0	.0	.0	.0	.0
South and East Asia	.2	.2	.3	.3	1.1	2.7
TOTAL	15.5	15.9	21.0	19.5	23.2	28.7

TABLE A-54

PRIMARY SOLAR SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.4	1.3	1.8	2.0	2.3
OECD Europe-Canada	.0	.2	.9	1.2	1.2	1.4
OECD Pacific	.0	.1	.3	.4	.5	.6
Centrally Planned Eur.	.0	.5	1.8	2.8	3.4	3.9
Centrally Planned Asia	.0	.0	.3	.6	1.0	1.7
Middle East	.0	.0	.3	.6	.6	.7
Africa	.0	.0	.0	.0	.0	.0
Latin America	.0	.0	.0	.0	.0	.0
South and East Asia	.0	.0	.0	.2	.5	1.3
TOTAL	.0	1.2	4.9	7.6	9.2	11.9

ENERGY REPORT: 2060 LOW EMISSIONS - LOWER GROWTH

TABLE A-55

PRIMARY ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	77.2	78.9	76.0	68.6	62.6	63.3
OECD Europe-Canada	58.6	61.2	65.1	60.5	55.3	55.8
OECD Pacific	17.8	18.2	17.1	16.4	16.0	17.5
Centrally Planned Eur.	72.7	81.8	94.8	95.4	95.2	99.5
Centrally Planned Asia	19.2	26.3	40.7	51.6	59.3	69.5
Middle East	8.5	10.0	21.7	22.4	17.8	16.2
Africa	7.2	8.4	9.8	11.8	14.2	18.0
Latin America	15.9	19.3	24.6	27.8	30.2	33.9
South and East Asia	13.9	17.8	24.0	32.8	43.2	57.8
TOTAL	291.0	321.9	373.8	387.3	393.8	431.5

TABLE A-56

SECONDARY ENERGY CONSUMPTION: FUEL VERSUS ELECTRICITY

FUEL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	50.1	48.6	40.9	36.2	30.9	29.4
OECD Europe-Canada	36.9	35.4	32.9	29.1	24.4	23.5
OECD Pacific	10.8	10.8	9.2	8.4	7.9	8.6
Centrally Planned Eur.	39.6	44.0	48.8	49.3	45.9	44.0
Centrally Planned Asia	13.8	18.4	26.5	31.9	32.8	32.8
Middle East	5.6	6.6	14.0	14.1	10.8	9.5
Africa	4.5	5.4	6.4	7.1	7.4	8.3
Latin America	11.5	13.9	17.3	17.5	16.5	16.1
South and East Asia	9.6	12.3	15.8	20.3	24.3	28.9
TOTAL	182.4	195.4	211.8	213.9	200.9	201.1

ELECTRICITY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	8.6	10.1	12.3	11.7	11.6	11.5
OECD Europe-Canada	7.1	8.6	11.1	11.0	10.6	10.8
OECD Pacific	2.3	2.4	2.7	2.8	2.9	3.0
Centrally Planned Eur.	10.4	12.6	16.3	16.7	17.9	18.3
Centrally Planned Asia	1.5	2.4	4.6	6.7	8.8	11.2
Middle East	.8	1.0	2.7	3.0	2.6	2.5
Africa	.7	.9	1.1	1.3	1.7	2.4
Latin America	1.4	1.8	2.4	3.1	3.9	4.8
South and East Asia	1.2	1.7	2.7	3.9	6.2	9.6
TOTAL	34.0	41.5	55.9	60.2	66.2	74.1

TOTAL ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	58.7	58.7	53.2	47.9	42.5	40.9
OECD Europe-Canada	44.0	44.0	44.0	40.1	35.0	34.3
OECD Pacific	13.1	13.2	11.9	11.2	10.8	11.6
Centrally Planned Eur.	50.0	56.6	65.1	66.0	63.8	62.3
Centrally Planned Asia	15.3	20.8	31.1	38.6	41.6	44.0
Middle East	6.4	7.6	16.7	17.1	13.4	12.0
Africa	5.2	6.3	7.5	8.4	9.1	10.7
Latin America	12.9	15.7	19.7	20.6	20.4	20.9
South and East Asia	10.8	14.0	18.5	24.2	30.5	38.5
TOTAL	216.4	236.9	267.7	274.1	267.1	275.2

TABLE A-57

SECONDARY OIL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	31.6	30.0	21.7	18.0	15.8	16.8
OECD Europe-Canada	25.3	24.0	20.3	16.8	14.0	14.6
OECD Pacific	8.2	7.9	6.5	5.4	5.0	5.8
Centrally Planned Eur.	16.0	17.3	18.7	17.7	17.4	19.7
Centrally Planned Asia	3.0	3.6	4.8	5.6	5.9	8.4
Middle East	4.8	5.4	10.5	10.0	7.7	7.1
Africa	2.8	3.3	3.8	3.6	3.4	3.8
Latin America	9.1	10.8	12.1	11.2	10.2	10.4
South and East Asia	5.9	7.2	7.9	9.3	10.6	13.3
TOTAL	106.7	109.5	106.3	97.6	90.0	99.9

TABLE A-58

SECONDARY GAS CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	14.7	14.2	14.7	14.0	11.0	8.7
OECD Europe-Canada	7.1	6.6	7.7	7.4	5.6	4.4
OECD Pacific	.8	.9	.7	1.0	.8	.7
Centrally Planned Eur.	14.1	18.3	22.3	23.9	21.2	18.1
Centrally Planned Asia	.1	.2	.3	.6	.7	.5
Middle East	.8	1.2	3.5	4.1	3.1	2.4
Africa	.5	.5	.6	.8	.7	.8
Latin America	1.8	2.3	3.8	4.7	4.4	3.9
South and East Asia	1.0	1.3	2.1	3.1	3.6	4.2
TOTAL	40.9	45.5	55.7	59.6	51.1	43.7

TABLE A-59

SECONDARY SOLIDS CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.8	4.4	4.5	4.2	4.1	3.9
OECD Europe-Canada	4.5	4.8	4.9	4.9	4.8	4.5
OECD Pacific	1.8	2.0	2.0	2.0	2.1	2.1
Centrally Planned Eur.	9.5	8.4	7.8	7.7	7.3	6.2
Centrally Planned Asia	10.7	14.6	21.4	25.7	26.2	23.9
Middle East	.0	.0	.0	.0	.0	.0
Africa	1.2	1.6	2.0	2.7	3.3	3.7
Latin America	.6	.8	1.4	1.6	1.9	1.8
South and East Asia	2.7	3.8	5.8	7.9	10.1	11.4
TOTAL	34.8	40.4	49.8	56.7	59.8	57.5

ENERGY REPORT: 2060 LOW EMISSIONS - LOWER GROWTH

TABLE A-60

RESIDENTIAL/COMMERCIAL ENERGY CONSUMPTION: FUEL VERSUS ELECTRICITY

FUEL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	11.4	9.7	7.7	6.9	5.7	4.7
OECD Europe-Canada	11.0	9.5	8.4	7.0	5.3	4.1
OECD Pacific	1.5	1.5	1.4	1.1	.9	.8
Centrally Planned Eur.	14.7	15.1	19.1	19.7	18.5	16.6
Centrally Planned Asia	3.4	3.9	4.6	6.2	7.3	7.6
Middle East	.3	.5	1.4	1.6	1.3	1.2
Africa	.4	.6	1.1	1.4	1.6	1.9
Latin America	1.6	1.9	2.4	2.6	2.6	2.5
South and East Asia	2.0	2.5	3.2	4.2	5.3	6.2
TOTAL	46.3	45.2	49.3	50.7	48.5	45.6

ELECTRICITY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	5.7	6.8	8.4	8.0	7.9	7.7
OECD Europe-Canada	3.9	4.6	6.0	5.6	5.0	4.7
OECD Pacific	1.1	1.2	1.5	1.5	1.5	1.5
Centrally Planned Eur.	2.9	3.2	4.8	5.0	5.6	6.0
Centrally Planned Asia	.2	.4	.9	1.4	2.1	2.9
Middle East	.2	.2	.8	1.0	.9	.9
Africa	.3	.4	.5	.6	.8	1.2
Latin America	.5	.7	.9	1.2	1.5	1.9
South and East Asia	.4	.6	1.1	1.6	2.5	3.9
TOTAL	15.2	18.1	24.9	25.9	27.8	30.7

TOTAL ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	17.1	16.5	16.1	14.9	13.6	12.4
OECD Europe-Canada	14.9	14.1	14.4	12.6	10.3	8.8
OECD Pacific	2.6	2.7	2.9	2.6	2.4	2.3
Centrally Planned Eur.	17.6	18.3	23.9	24.7	24.1	22.6
Centrally Planned Asia	3.6	4.3	5.5	7.6	9.4	10.5
Middle East	.5	.7	2.2	2.6	2.2	2.1
Africa	.7	1.0	1.6	2.0	2.4	3.1
Latin America	2.1	2.6	3.3	3.8	4.1	4.4
South and East Asia	2.4	3.1	4.3	5.8	7.8	10.1
TOTAL	61.5	63.3	74.2	76.6	76.3	76.3

TABLE A-61

INDUSTRIAL ENERGY CONSUMPTION: FUEL VERSUS ELECTRICITY

FUEL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	17.6	18.1	17.4	15.5	12.5	10.3
OECD Europe-Canada	12.3	11.8	10.9	10.2	8.5	7.4
OECD Pacific	4.6	4.5	3.7	3.4	3.1	2.9
Centrally Planned Eur.	16.1	16.6	14.8	15.0	12.6	9.7
Centrally Planned Asia	9.4	13.1	19.5	22.3	21.2	18.7
Middle East	4.2	4.8	9.5	9.3	6.7	5.1
Africa	2.0	2.2	2.0	2.6	2.9	3.1
Latin America	5.6	6.7	8.2	8.7	8.0	6.9
South and East Asia	5.0	6.5	8.1	10.8	12.5	13.5
TOTAL	76.8	84.3	94.1	97.8	88.0	77.6

ELECTRICITY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	2.9	3.3	3.9	3.7	3.7	3.8
OECD Europe-Canada	3.0	3.8	4.8	5.1	5.2	5.6
OECD Pacific	1.1	1.2	1.2	1.3	1.4	1.5
Centrally Planned Eur.	7.4	9.3	11.4	11.6	12.1	12.1
Centrally Planned Asia	1.3	2.0	3.7	5.2	6.5	8.0
Middle East	.6	.8	1.9	2.0	1.7	1.6
Africa	.4	.5	.6	.7	.9	1.2
Latin America	.9	1.1	1.5	1.9	2.4	2.9
South and East Asia	.8	1.1	1.6	2.3	3.7	5.5
TOTAL	18.4	23.1	30.6	33.8	37.6	42.2

TOTAL ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	20.5	21.4	21.3	19.2	16.2	14.1
OECD Europe-Canada	15.3	15.6	15.7	15.3	13.7	13.0
OECD Pacific	5.7	5.7	4.9	4.7	4.5	4.4
Centrally Planned Eur.	23.5	25.9	26.2	26.6	24.7	21.8
Centrally Planned Asia	10.7	15.1	23.2	27.5	27.7	26.7
Middle East	4.8	5.6	11.4	11.3	8.4	6.7
Africa	2.4	2.7	2.6	3.3	3.8	4.3
Latin America	6.5	7.8	9.7	10.6	10.4	9.8
South and East Asia	5.8	7.6	9.7	13.1	16.2	19.0
TOTAL	95.2	107.4	124.7	131.6	125.6	119.8

TABLE A-62

TRANSPORTATION ENERGY CONSUMPTION: FUEL VERSUS ELECTRICITY

FUEL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	21.1	20.8	15.8	13.8	12.7	14.4
OECD Europe-Canada	13.6	14.1	13.6	11.9	10.6	12.0
OECD Pacific	4.7	4.8	4.1	3.9	3.9	4.9
Centrally Planned Eur.	8.8	12.3	14.9	14.6	14.8	17.7
Centrally Planned Asia	1.0	1.4	2.4	3.4	4.3	6.5
Middle East	1.1	1.3	3.1	3.2	2.8	3.2
Africa	2.1	2.6	3.3	3.1	2.9	3.3
Latin America	4.3	5.3	6.7	6.2	5.9	6.7
South and East Asia	2.6	3.3	4.5	5.3	6.5	9.2
TOTAL	59.3	65.9	68.4	65.4	64.4	77.9

ELECTRICITY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.0	.0	.0	.0
OECD Europe-Canada	.2	.2	.3	.3	.4	.5
OECD Pacific	.1	.0	.0	.0	.0	.0
Centrally Planned Eur.	.1	.1	.1	.1	.2	.2
Centrally Planned Asia	.0	.0	.0	.1	.2	.3
Middle East	.0	.0	.0	.0	.0	.0
Africa	.0	.0	.0	.0	.0	.0
Latin America	.0	.0	.0	.0	.0	.0
South and East Asia	.0	.0	.0	.0	.0	.2
TOTAL	.4	.3	.4	.5	.8	1.2

TOTAL ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	21.1	20.8	15.8	13.8	12.7	14.4
OECD Europe-Canada	13.8	14.3	13.9	12.2	11.0	12.5
OECD Pacific	4.8	4.8	4.1	3.9	3.9	4.9
Centrally Planned Eur.	8.9	12.4	15.0	14.7	15.0	17.9
Centrally Planned Asia	1.0	1.4	2.4	3.5	4.5	6.8
Middle East	1.1	1.3	3.1	3.2	2.8	3.2
Africa	2.1	2.6	3.3	3.1	2.9	3.3
Latin America	4.3	5.3	6.7	6.2	5.9	6.7
South and East Asia	2.6	3.3	4.5	5.3	6.5	9.4
TOTAL	59.7	66.2	68.8	65.9	65.2	79.1

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TABLE A-63

ELECTRIC UTILITY ENERGY CONSUMPTION

ELECTRICITY OIL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	1.3	2.1	2.5	2.1	1.7	1.5
OECD Europe-Canada	1.5	1.6	1.7	1.4	1.0	.9
OECD Pacific	1.4	1.0	.6	.5	.4	.4
Centrally Planned Eur.	4.9	4.5	3.9	3.3	2.9	2.6
Centrally Planned Asia	.8	.9	.7	.7	.9	1.1
Middle East	1.2	1.0	1.1	.8	.5	.5
Africa	.4	.4	.2	.0	.0	.0
Latin America	.4	.0	.0	.0	.0	.0
South and East Asia	.7	.6	.2	.2	.4	.9
TOTAL	12.6	12.1	10.9	9.0	7.8	7.9

ELECTRICITY GAS CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.9	7.5	9.2	8.7	6.7	5.3
OECD Europe-Canada	1.0	2.9	5.4	5.5	4.1	3.3
OECD Pacific	.4	1.1	1.8	2.0	1.6	1.3
Centrally Planned Eur.	5.9	9.9	12.7	13.3	11.2	9.2
Centrally Planned Asia	.0	.8	1.9	3.0	3.3	3.9
Middle East	1.5	1.9	3.4	3.0	2.1	1.6
Africa	.5	.8	.6	.3	.0	.1
Latin America	.5	.0	.0	.0	.0	.0
South and East Asia	.3	.6	.6	.7	1.7	3.0
TOTAL	14.0	25.5	35.6	36.5	30.7	27.7

ELECTRICITY SOLIDS CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	14.7	12.6	12.8	10.7	10.7	11.4
OECD Europe-Canada	4.1	4.6	6.7	6.7	6.5	7.0
OECD Pacific	2.1	1.9	2.3	2.4	2.5	2.8
Centrally Planned Eur.	17.3	16.9	18.4	16.3	17.8	19.6
Centrally Planned Asia	3.5	3.9	3.7	3.5	5.3	8.4
Middle East	.0	.2	1.7	1.9	1.7	1.7
Africa	1.5	1.4	.9	.4	.0	.2
Latin America	.1	.0	.0	.0	.0	.0
South and East Asia	1.6	1.5	1.0	.9	2.6	6.4
TOTAL	44.9	43.0	47.5	42.8	47.1	57.5

ELECTRICITY HYDRO CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.3	3.8	4.3	4.6	4.7	4.8
OECD Europe-Canada	8.2	9.6	10.6	11.0	11.1	11.1
OECD Pacific	1.2	1.3	1.3	1.4	1.4	1.4
Centrally Planned Eur.	2.5	3.1	3.6	3.7	3.7	3.7
Centrally Planned Asia	1.0	2.3	6.4	10.0	11.3	11.6
Middle East	.1	.2	.4	.6	.7	.7
Africa	.2	.4	1.3	3.2	5.2	6.6
Latin America	3.3	5.4	7.4	9.4	11.9	14.5
South and East Asia	1.4	2.6	5.9	9.4	11.4	12.1
TOTAL	21.2	28.7	41.2	53.3	61.4	66.5

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ELECTRICITY NUCLEAR CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.9	3.9	4.8	4.0	4.4	4.9
OECD Europe-Canada	6.9	6.8	6.9	5.1	5.4	6.0
OECD Pacific	1.9	2.0	1.5	1.2	1.3	1.5
Centrally Planned Eur.	2.6	3.0	5.6	6.1	7.4	8.4
Centrally Planned Asia	.0	.0	1.0	1.4	2.2	3.6
Middle East	.0	.0	.7	1.3	1.4	1.5
Africa	.0	.0	.2	.1	.0	.1
Latin America	.0	.0	.0	.0	.0	.0
South and East Asia	.2	.2	.3	.3	1.1	2.7
TOTAL	15.5	15.9	21.0	19.5	23.2	28.7

ELECTRICITY SOLAR CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.4	1.3	1.8	2.0	2.3
OECD Europe-Canada	.0	.2	.9	1.2	1.2	1.4
OECD Pacific	.0	.1	.3	.4	.5	.6
Centrally Planned Eur.	.0	.5	1.8	2.8	3.4	3.9
Centrally Planned Asia	.0	.0	.3	.6	1.0	1.7
Middle East	.0	.0	.3	.6	.6	.7
Africa	.0	.0	.0	.0	.0	.0
Latin America	.0	.0	.0	.0	.0	.0
South and East Asia	.0	.0	.0	.2	.5	1.3
TOTAL	.0	1.2	4.9	7.6	9.2	11.9

TOTAL ELECTRIC UTILITY ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	27.1	30.3	34.9	31.9	30.2	30.2
OECD Europe-Canada	21.7	25.7	32.2	30.9	29.3	29.7
OECD Pacific	7.0	7.4	7.8	7.9	7.7	8.0
Centrally Planned Eur.	33.2	37.9	46.0	45.5	46.4	47.4
Centrally Planned Asia	5.3	7.9	14.0	19.2	24.0	30.3
Middle East	2.8	3.3	7.6	8.2	7.0	6.7
Africa	2.6	3.0	3.2	4.0	5.2	7.0
Latin America	4.3	5.4	7.4	9.4	11.9	14.5
South and East Asia	4.2	5.5	8.0	11.7	17.7	26.4
TOTAL	108.2	126.4	161.1	168.7	179.4	200.2

TABLE A-64

ENERGY CONVERSION EFFICIENCY AT ELECTRIC UTILITY POWERPLANTS

(percent)

REGION	1985	2000	2025	2050	2075	2100
United States	31.7	33.3	35.0	36.4	38.4	38.7
OECD Europe-Canada	32.7	33.1	34.5	35.6	36.2	36.4
OECD Pacific	32.9	32.4	33.3	36.7	37.7	38.8
Centrally Planned Eur.	31.6	33.5	35.7	36.9	38.4	38.6
Centrally Planned Asia	26.4	30.4	32.1	35.4	36.7	37.3
Middle East	25.0	27.3	34.2	35.4	37.1	37.3
Africa	23.1	30.0	28.1	32.5	32.7	31.4
Latin America	30.2	33.3	33.8	33.0	33.6	33.1
South and East Asia	26.2	30.9	31.3	32.5	36.2	36.0

*Includes transmission and distribution losses

TABLE A-65

SYNTHETIC PRODUCTION OF OIL AND GAS

OIL FROM SYNFUELS

(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.0	.4	2.2	6.4
OECD Europe-Canada	.0	.0	.0	.1	.9	4.2
OECD Pacific	.0	.0	.0	.1	.6	1.8
Centrally Planned Eur.	.0	.0	.1	.7	3.9	13.4
Centrally Planned Asia	.0	.0	.1	.7	3.8	11.2
Middle East	.0	.0	.0	.0	.0	.0
Africa	.0	.0	.0	.0	.3	1.8
Latin America	.0	.0	.0	.0	.3	.7
South and East Asia	.0	.0	.0	.0	.5	.9
TOTAL	.0	.0	.2	2.0	12.5	40.4

GAS FROM SYNFUELS

(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.0	.7	1.3	2.2
OECD Europe-Canada	.0	.0	.0	.5	.9	1.5
OECD Pacific	.0	.0	.0	.2	.5	.8
Centrally Planned Eur.	.0	.0	.0	1.3	2.4	4.1
Centrally Planned Asia	.0	.0	.0	.6	1.2	2.0
Middle East	.0	.0	.0	.0	.0	.0
Africa	.0	.0	.0	1.7	3.1	5.0
Latin America	.0	.0	.0	2.5	4.7	7.5
South and East Asia	.0	.0	.0	1.1	2.1	3.3
TOTAL	.0	.0	.0	8.6	16.2	26.4

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TABLE A-66

ENERGY USED FOR SYNTHETIC FUEL PRODUCTION BY TYPE

COAL USED IN SYNFUEL PRODUCTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.1	.6	3.2	9.6
OECD Europe-Canada	.0	.0	.0	.4	2.1	6.3
OECD Pacific	.0	.0	.0	.2	.9	2.6
Centrally Planned Eur.	.0	.0	.2	.9	5.7	20.2
Centrally Planned Asia	.0	.0	.2	1.1	5.9	17.2
Middle East	.0	.0	.0	.0	.0	.0
Africa	.0	.0	.0	.1	.6	2.3
Latin America	.0	.0	.0	.0	.3	1.0
South and East Asia	.0	.0	.0	.3	1.1	2.0
TOTAL	.0	.0	.5	3.6	19.8	61.2

BIOMASS USED IN SYNFUEL PRODUCTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.0	.9	1.8	2.9
OECD Europe-Canada	.0	.0	.0	.7	1.3	2.0
OECD Pacific	.0	.0	.0	.3	.6	1.0
Centrally Planned Eur.	.0	.0	.0	1.8	3.4	5.4
Centrally Planned Asia	.0	.0	.0	.8	1.6	2.5
Middle East	.0	.0	.0	.0	.0	.0
Africa	.0	.0	.0	2.3	4.4	7.0
Latin America	.0	.0	.0	3.4	6.6	10.5
South and East Asia	.0	.0	.0	1.5	2.9	4.6
TOTAL	.0	.0	.0	11.7	22.6	35.9

TOTAL USED IN SYNFUEL PRODUCTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.1	1.5	5.0	12.5
OECD Europe-Canada	.0	.0	.0	1.1	3.4	8.3
OECD Pacific	.0	.0	.0	.5	1.5	3.6
Centrally Planned Eur.	.0	.0	.2	2.7	9.1	25.6
Centrally Planned Asia	.0	.0	.2	1.9	7.5	19.7
Middle East	.0	.0	.0	.0	.0	.0
Africa	.0	.0	.0	2.4	5.0	9.3
Latin America	.0	.0	.0	3.4	6.9	11.5
South and East Asia	.0	.0	.0	1.8	4.0	6.6
TOTAL	.0	.0	.5	15.3	42.4	97.1

TABLE A-67

CO2 EMISSIONS FROM FOSSIL FUEL
(Petagrams C/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	1.3	1.4	1.3	1.1	1.0	1.1
OECD Europe-Canada	.8	.8	.9	.8	.7	.8
OECD Pacific	.3	.3	.3	.3	.3	.3
Centrally Planned Eur.	1.4	1.5	1.6	1.6	1.6	1.7
Centrally Planned Asia	.5	.6	.8	1.0	1.1	1.3
Middle East	.1	.2	.3	.3	.3	.3
Africa	.1	.2	.2	.2	.1	.2
Latin America	.2	.2	.3	.3	.3	.3
South and East Asia	.3	.3	.4	.4	.6	.8
TOTAL	5.1	5.4	6.1	6.0	6.0	6.7

TABLE A-68

CO EMISSIONS FROM FOSSIL FUEL
(Teragrams C/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	51.0	27.5	12.5	10.0	9.2	10.4
OECD Europe-Canada	39.0	32.1	10.8	8.8	7.8	8.7
OECD Pacific	13.5	10.9	3.3	2.9	2.9	3.5
Centrally Planned Eur.	35.0	36.0	29.4	11.2	11.3	13.2
Centrally Planned Asia	4.7	5.4	6.3	4.5	5.3	6.8
Middle East	4.2	3.9	6.1	2.5	2.1	2.4
Africa	8.1	7.7	6.5	2.4	2.4	2.8
Latin America	16.7	15.3	12.9	4.6	4.5	5.1
South and East Asia	10.2	9.9	9.1	4.4	5.5	7.6
TOTAL	182.3	148.6	97.2	51.4	51.0	60.4

TABLE A-69

NOX EMISSIONS FROM FOSSIL FUEL
(Teragrams N/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	6.3	5.6	3.2	2.3	2.0	2.1
OECD Europe-Canada	3.9	3.8	2.5	2.0	1.7	1.8
OECD Pacific	1.5	1.4	.8	.7	.6	.7
Centrally Planned Eur.	6.1	6.3	4.8	3.0	2.8	3.1
Centrally Planned Asia	2.0	2.6	3.2	1.9	1.9	2.2
Middle East	.5	.6	1.1	.9	.6	.6
Africa	.8	.9	.8	.6	.6	.8
Latin America	1.1	1.2	1.3	1.0	1.1	1.3
South and East Asia	1.1	1.4	1.5	1.2	1.4	1.9
TOTAL	23.3	23.8	19.1	13.4	12.7	14.5

TABLE A-70

PRIMARY ENERGY SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	66.8	53.6	51.2	66.9	83.9	94.5
OECD Europe-Canada	47.2	44.1	48.8	52.1	57.9	58.0
OECD Pacific	8.8	10.1	11.6	14.4	19.2	22.3
Centrally Planned Eur.	80.1	84.1	99.0	120.3	167.0	237.1
Centrally Planned Asia	26.7	32.5	63.7	99.8	151.4	194.3
Middle East	24.9	51.4	72.0	86.4	62.4	41.6
Africa	17.2	22.6	35.0	52.9	65.7	56.8
Latin America	21.2	24.2	38.6	71.6	86.7	84.2
South and East Asia	21.7	19.0	27.8	37.3	53.1	63.9
TOTAL	314.6	341.6	447.7	601.7	747.3	852.7

TABLE A-71

PRIMARY OIL SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	22.7	12.2	6.0	7.1	7.0	5.9
OECD Europe-Canada	12.4	9.0	7.5	6.4	4.4	2.8
OECD Pacific	1.2	.6	.2	.0	.0	.0
Centrally Planned Eur.	26.5	21.0	16.8	12.9	8.4	5.2
Centrally Planned Asia	5.4	6.4	6.7	5.3	3.4	2.1
Middle East	23.3	47.3	53.0	43.5	29.3	18.3
Africa	11.3	15.1	18.4	18.4	13.2	8.5
Latin America	14.7	10.7	10.8	26.8	30.5	26.5
South and East Asia	11.1	5.8	3.0	2.3	1.7	1.3
TOTAL	128.6	128.1	122.4	122.7	97.9	70.6

TABLE A-72

PRIMARY GAS SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	17.2	16.4	13.1	10.6	6.0	2.6
OECD Europe-Canada	9.6	9.3	11.3	9.7	7.4	3.5
OECD Pacific	.7	1.8	1.8	1.3	.7	.3
Centrally Planned Eur.	23.4	30.6	35.6	24.9	11.8	4.9
Centrally Planned Asia	.5	2.0	5.1	4.4	2.2	.9
Middle East	1.5	3.9	16.9	36.1	21.7	9.6
Africa	1.7	3.2	6.7	9.2	6.5	3.0
Latin America	2.6	5.5	9.2	8.0	4.9	2.2
South and East Asia	2.9	2.9	4.3	3.3	1.7	.7
TOTAL	60.1	75.6	104.0	107.5	62.9	27.7

TABLE A-73

PRIMARY COAL SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	19.7	16.6	21.0	33.3	50.7	66.0
OECD Europe-Canada	10.3	8.9	10.9	13.7	20.5	26.7
OECD Pacific	3.9	4.0	5.3	7.3	10.9	14.3
Centrally Planned Eur.	25.1	25.5	32.6	55.5	108.5	186.9
Centrally Planned Asia	19.8	21.6	40.9	65.2	104.5	140.9
Middle East	.0	.0	.0	.0	.0	.0
Africa	4.0	3.9	7.0	12.2	21.8	16.0
Latin America	.6	1.1	2.7	3.9	2.9	2.4
South and East Asia	6.1	7.3	11.1	7.5	6.4	6.2
TOTAL	89.5	88.9	131.5	198.6	326.2	459.4

ENERGY REPORT: 2060 LOW EMISSIONS - HIGHER GROWTH

TABLE A-74

PRIMARY BIOMASS SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.2	2.8	5.2	5.7
OECD Europe-Canada	.0	.0	.2	2.0	3.7	4.1
OECD Pacific	.0	.0	.0	1.0	1.9	2.0
Centrally Planned Eur.	.0	.0	.4	5.2	9.8	10.7
Centrally Planned Asia	.0	.0	.2	2.4	4.6	5.0
Middle East	.0	.0	.0	.0	.1	.2
Africa	.0	.0	.5	6.8	12.8	14.0
Latin America	.0	.0	.8	10.2	19.2	21.0
South and East Asia	.0	.0	.4	4.5	8.4	9.2
TOTAL	.0	.0	2.7	34.9	65.7	71.9

TABLE A-75

PRIMARY HYDROELECTRIC SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.3	3.8	4.3	4.6	4.7	4.8
OECD Europe-Canada	8.2	9.6	10.6	11.0	11.1	11.1
OECD Pacific	1.2	1.3	1.3	1.4	1.4	1.4
Centrally Planned Eur.	2.5	3.1	3.6	3.7	3.7	3.7
Centrally Planned Asia	1.0	2.3	6.4	10.0	11.3	11.6
Middle East	.1	.2	.4	.6	.7	.7
Africa	.2	.4	1.3	3.2	5.3	6.6
Latin America	3.3	6.9	14.9	19.2	20.4	20.6
South and East Asia	1.4	2.6	5.9	9.4	11.4	12.1
TOTAL	21.2	30.2	48.7	63.1	70.0	72.6

TABLE A-76

PRIMARY NUCLEAR SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.9	4.2	5.1	5.8	6.9	6.2
OECD Europe-Canada	6.7	7.0	7.4	7.5	8.7	7.8
OECD Pacific	1.8	2.3	2.5	2.5	3.1	3.0
Centrally Planned Eur.	2.6	3.4	7.6	12.3	16.7	16.8
Centrally Planned Asia	.0	.1	3.3	8.5	17.1	22.1
Middle East	.0	.0	1.2	4.2	7.1	8.4
Africa	.0	.0	.8	2.1	4.1	5.7
Latin America	.0	.0	.2	2.4	5.9	7.5
South and East Asia	.2	.4	2.3	7.0	15.8	22.5
TOTAL	15.2	17.4	30.4	52.3	85.4	100.0

TABLE A-77

PRIMARY SOLAR SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.4	1.5	2.7	3.4	3.3
OECD Europe-Canada	.0	.3	.9	1.8	2.1	2.0
OECD Pacific	.0	.1	.5	.9	1.2	1.3
Centrally Planned Eur.	.0	.5	2.4	5.8	8.1	8.9
Centrally Planned Asia	.0	.1	1.1	4.0	8.3	11.7
Middle East	.0	.0	.5	2.0	3.5	4.4
Africa	.0	.0	.3	1.0	2.0	3.0
Latin America	.0	.0	.0	1.1	2.9	4.0
South and East Asia	.0	.0	.8	3.3	7.7	11.9
TOTAL	.0	1.4	8.0	22.6	39.2	50.5

ENERGY REPORT: 2060 LOW EMISSIONS - HIGHER GROWTH

TABLE A-78

PRIMARY ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	77.2	77.2	66.3	65.6	64.8	64.1
OECD Europe-Canada	58.3	59.5	56.6	57.5	55.6	53.6
OECD Pacific	17.6	19.0	18.5	20.0	21.0	21.7
Centrally Planned Eur.	72.7	84.9	99.3	121.4	137.9	155.5
Centrally Planned Asia	19.2	31.3	65.1	107.5	151.7	184.0
Middle East	8.5	12.2	26.4	38.4	45.7	50.0
Africa	7.2	10.9	20.5	33.8	50.2	59.8
Latin America	15.9	24.7	46.4	71.6	88.0	95.7
South and East Asia	13.9	22.9	47.5	86.9	131.2	167.2
TOTAL	290.5	342.6	446.6	602.7	746.1	851.6

TABLE A-79

SECONDARY ENERGY CONSUMPTION: FUEL VERSUS ELECTRICITY

FUEL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	50.1	46.9	34.4	29.9	23.9	21.1
OECD Europe-Canada	36.9	33.9	26.0	22.6	18.4	16.6
OECD Pacific	10.7	10.8	8.2	7.7	6.8	6.8
Centrally Planned Eur.	39.6	44.8	48.1	53.0	48.9	47.6
Centrally Planned Asia	13.8	20.9	37.4	51.8	55.4	53.3
Middle East	5.6	8.0	16.1	21.0	21.0	20.7
Africa	4.5	6.9	12.7	17.2	19.5	21.3
Latin America	11.5	17.3	29.9	37.5	37.1	36.4
South and East Asia	9.6	14.9	26.2	41.0	48.7	53.2
TOTAL	182.3	204.4	239.0	281.7	279.7	277.0

ELECTRICITY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	8.6	10.0	11.1	12.3	13.0	12.0
OECD Europe-Canada	7.0	8.4	10.5	11.9	12.4	11.6
OECD Pacific	2.2	2.7	3.6	4.3	4.8	4.7
Centrally Planned Eur.	10.4	13.3	17.9	24.1	28.9	29.6
Centrally Planned Asia	1.5	3.1	9.2	19.1	31.9	41.1
Middle East	.8	1.3	3.6	6.4	9.2	10.9
Africa	.7	1.3	2.5	5.0	8.4	11.6
Latin America	1.4	2.4	5.4	10.8	16.5	19.5
South and East Asia	1.2	2.5	7.1	16.2	30.0	41.9
TOTAL	33.8	45.0	70.9	110.1	155.1	182.9

TOTAL ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	58.7	56.9	45.5	42.2	36.9	33.1
OECD Europe-Canada	43.9	42.3	36.5	34.5	30.8	28.2
OECD Pacific	12.9	13.5	11.8	12.0	11.6	11.5
Centrally Planned Eur.	50.0	58.1	66.0	77.1	77.8	77.2
Centrally Planned Asia	15.3	24.0	46.6	70.9	87.3	94.4
Middle East	6.4	9.3	19.7	27.4	30.2	31.6
Africa	5.2	8.2	15.2	22.2	27.9	32.9
Latin America	12.9	19.7	35.3	48.3	53.6	55.9
South and East Asia	10.8	17.4	33.3	57.2	78.7	95.1
TOTAL	216.1	249.4	309.9	391.8	434.8	459.9

TABLE A-80

SECONDARY OIL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	31.6	28.9	16.6	13.4	11.4	11.6
OECD Europe-Canada	25.3	22.7	14.1	11.3	9.6	9.5
OECD Pacific	8.1	7.9	5.1	4.5	4.0	4.4
Centrally Planned Eur.	16.0	17.6	16.9	17.0	17.3	20.5
Centrally Planned Asia	3.0	4.3	6.7	9.4	12.0	16.9
Middle East	4.8	6.6	11.7	14.5	15.4	15.6
Africa	2.8	4.2	7.2	8.3	9.0	10.7
Latin America	9.1	13.2	19.4	22.6	23.6	24.8
South and East Asia	5.9	8.5	11.5	17.1	21.7	27.8
TOTAL	106.6	113.9	109.2	118.1	124.0	141.8

TABLE A-81

SECONDARY GAS CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	14.7	13.8	13.4	12.1	8.4	6.3
OECD Europe-Canada	7.1	6.6	7.3	6.6	4.6	3.6
OECD Pacific	.8	1.0	1.1	1.1	.8	.7
Centrally Planned Eur.	14.1	19.5	24.6	29.3	25.3	22.2
Centrally Planned Asia	.1	.3	.7	1.3	1.5	1.7
Middle East	.8	1.4	4.4	6.5	5.6	5.1
Africa	.5	.7	1.5	2.3	2.4	2.6
Latin America	1.8	3.1	8.1	11.6	10.3	9.2
South and East Asia	1.0	1.8	4.6	7.9	8.8	9.5
TOTAL	40.9	48.2	65.7	78.7	67.7	60.9

TABLE A-82

SECONDARY SOLIDS CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.8	4.2	4.4	4.4	4.1	3.2
OECD Europe-Canada	4.5	4.6	4.6	4.7	4.2	3.5
OECD Pacific	1.8	1.9	2.0	2.1	2.0	1.7
Centrally Planned Eur.	9.5	7.7	6.6	6.7	6.3	4.9
Centrally Planned Asia	10.7	16.3	30.0	41.1	41.9	34.7
Middle East	.0	.0	.0	.0	.0	.0
Africa	1.2	2.0	4.0	6.6	8.1	8.0
Latin America	.6	1.0	2.4	3.3	3.2	2.4
South and East Asia	2.7	4.6	10.1	16.0	18.2	15.9
TOTAL	34.8	42.3	64.1	84.9	88.0	74.3

ENERGY REPORT: 2060 LOW EMISSIONS - HIGHER GROWTH

TABLE A-83

RESIDENTIAL/COMMERCIAL ENERGY CONSUMPTION: FUEL VERSUS ELECTRICITY

FUEL CONSUMPUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	11.4	8.6	4.3	4.0	3.2	2.6
OECD Europe-Canada	11.0	9.3	7.8	6.7	5.0	3.9
OECD Pacific	1.5	1.5	1.5	1.4	1.1	1.0
Centrally Planned Eur.	14.7	16.3	21.7	25.1	22.9	20.6
Centrally Planned Asia	3.4	4.3	5.6	10.1	14.1	15.5
Middle East	.3	.6	1.3	2.0	2.6	3.0
Africa	.4	.8	1.4	2.5	3.3	3.8
Latin America	1.6	2.1	3.1	4.7	5.6	6.1
South and East Asia	2.0	2.8	4.1	7.0	9.2	10.3
TOTAL	46.3	46.3	50.8	63.5	67.0	66.8

ELECTRICITY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	5.7	6.3	6.6	7.2	7.5	7.0
OECD Europe-Canada	3.9	4.5	5.7	6.1	6.1	5.4
OECD Pacific	1.1	1.4	2.1	2.5	2.7	2.7
Centrally Planned Eur.	2.9	3.8	6.8	9.0	11.2	11.6
Centrally Planned Asia	.2	.4	1.0	2.7	5.8	9.5
Middle East	.2	.3	.8	1.7	2.9	4.2
Africa	.3	.5	.8	1.8	3.2	4.7
Latin America	.5	.8	1.4	3.2	5.5	7.5
South and East Asia	.4	.9	2.3	5.5	10.7	16.0
TOTAL	15.2	18.9	27.5	39.7	55.6	68.6

TOTAL ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	17.1	14.9	10.9	11.2	10.7	9.6
OECD Europe-Canada	14.9	13.8	13.5	12.8	11.1	9.3
OECD Pacific	2.6	2.9	3.6	3.9	3.8	3.7
Centrally Planned Eur.	17.6	20.1	28.5	34.1	34.1	32.2
Centrally Planned Asia	3.6	4.7	6.6	12.8	19.9	25.0
Middle East	.5	.9	2.1	3.7	5.5	7.2
Africa	.7	1.3	2.2	4.3	6.5	8.5
Latin America	2.1	2.9	4.5	7.9	11.1	13.6
South and East Asia	2.4	3.7	6.4	12.5	19.9	26.3
TOTAL	61.5	65.2	78.3	103.2	122.6	135.4

ENERGY REPORT: 2060 LOW EMISSIONS - HIGHER GROWTH

TABLE A-84

INDUSTRIAL ENERGY CONSUMPTION: FUEL VERSUS ELECTRICITY

FUEL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	17.6	18.4	18.1	16.2	12.2	9.2
OECD Europe-Canada	12.3	11.9	10.1	9.1	7.3	5.8
OECD Pacific	4.6	4.6	3.5	3.5	3.0	2.5
Centrally Planned Eur.	16.1	16.1	13.0	14.1	11.5	8.7
Centrally Planned Asia	9.4	15.0	28.5	36.4	33.3	24.4
Middle East	4.2	5.9	11.9	15.2	13.8	11.2
Africa	2.0	2.8	5.0	7.7	8.7	8.4
Latin America	5.6	9.2	17.5	21.8	19.1	14.5
South and East Asia	5.0	8.6	17.2	26.3	28.2	24.5
TOTAL	76.8	92.5	124.8	150.3	137.1	109.2

ELECTRICITY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	2.9	3.7	4.5	5.1	5.5	5.0
OECD Europe-Canada	3.0	3.9	4.6	5.6	6.1	5.9
OECD Pacific	1.1	1.3	1.5	1.8	2.1	2.0
Centrally Planned Eur.	7.4	9.4	11.0	14.9	17.5	17.7
Centrally Planned Asia	1.3	2.7	8.1	16.1	25.7	30.8
Middle East	.6	1.0	2.8	4.7	6.3	6.7
Africa	.4	.8	1.7	3.2	5.2	6.9
Latin America	.9	1.6	4.0	7.6	11.0	11.9
South and East Asia	.8	1.6	4.7	10.5	18.9	25.3
TOTAL	18.4	26.0	42.9	69.5	98.3	112.2

TOTAL ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	20.5	22.1	22.6	21.3	17.7	14.2
OECD Europe-Canada	15.3	15.8	14.7	14.7	13.4	11.7
OECD Pacific	5.7	5.9	5.0	5.3	5.1	4.5
Centrally Planned Eur.	23.5	25.5	24.0	29.0	29.0	26.4
Centrally Planned Asia	10.7	17.7	36.6	52.5	59.0	55.2
Middle East	4.8	6.9	14.7	19.9	20.1	17.9
Africa	2.4	3.6	6.7	10.9	13.9	15.3
Latin America	6.5	10.8	21.5	29.4	30.1	26.4
South and East Asia	5.8	10.2	21.9	36.8	47.1	49.8
TOTAL	95.2	118.5	167.7	219.8	235.4	221.4

TABLE A-85

TRANSPORTATION ENERGY CONSUMPTION: FUEL VERSUS ELECTRICITY

FUEL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	21.1	19.9	12.0	9.7	8.5	9.3
OECD Europe-Canada	13.6	12.7	8.1	6.8	6.1	6.9
OECD Pacific	4.6	4.7	3.2	2.8	2.7	3.3
Centrally Planned Eur.	8.8	12.4	13.4	13.8	14.5	18.3
Centrally Planned Asia	1.0	1.6	3.3	5.3	8.0	13.4
Middle East	1.1	1.5	2.9	3.8	4.6	6.5
Africa	2.1	3.3	6.3	7.0	7.5	9.1
Latin America	4.3	6.0	9.3	11.0	12.4	15.8
South and East Asia	2.6	3.5	4.9	7.7	11.3	18.4
TOTAL	59.2	65.6	63.4	67.9	75.6	101.0

ELECTRICITY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.0	.0	.0	.0
OECD Europe-Canada	.1	.0	.2	.2	.2	.3
OECD Pacific	.0	.0	.0	.0	.0	.0
Centrally Planned Eur.	.1	.1	.1	.2	.2	.3
Centrally Planned Asia	.0	.0	.1	.3	.4	.8
Middle East	.0	.0	.0	.0	.0	.0
Africa	.0	.0	.0	.0	.0	.0
Latin America	.0	.0	.0	.0	.0	.1
South and East Asia	.0	.0	.1	.2	.4	.6
TOTAL	.2	.1	.5	.9	1.2	2.1

TOTAL ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	21.1	19.9	12.0	9.7	8.5	9.3
OECD Europe-Canada	13.7	12.7	8.3	7.0	6.3	7.2
OECD Pacific	4.6	4.7	3.2	2.8	2.7	3.3
Centrally Planned Eur.	8.9	12.5	13.5	14.0	14.7	18.6
Centrally Planned Asia	1.0	1.6	3.4	5.6	8.4	14.2
Middle East	1.1	1.5	2.9	3.8	4.6	6.5
Africa	2.1	3.3	6.3	7.0	7.5	9.1
Latin America	4.3	6.0	9.3	11.0	12.4	15.9
South and East Asia	2.6	3.5	5.0	7.9	11.7	19.0
TOTAL	59.4	65.7	63.9	68.8	76.8	103.1

2060 LOW EMISSIONS - HIGHER GROWTH

TABLE A-86

ELECTRIC UTILITY ENERGY CONSUMPTION

ELECTRICITY OIL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	1.3	2.2	2.2	2.1	2.1	1.8
OECD Europe-Canada	1.5	1.6	1.4	1.4	1.3	1.1
OECD Pacific	1.4	1.2	.8	.8	.7	.7
Centrally Planned Eur.	4.9	5.0	4.2	4.6	5.0	4.9
Centrally Planned Asia	.8	1.3	1.9	3.2	5.1	6.4
Middle East	1.2	1.3	1.5	1.6	2.1	2.4
Africa	.4	.5	.6	.8	1.2	1.6
Latin America	.4	.1	.2	1.1	1.8	2.2
South and East Asia	.7	1.1	1.6	2.6	4.7	6.5
TOTAL	12.6	14.3	14.4	18.2	24.0	27.6

ELECTRICITY GAS CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.9	7.3	7.1	6.6	4.8	3.7
OECD Europe-Canada	.9	2.7	4.1	4.3	3.0	2.3
OECD Pacific	.4	1.2	2.1	2.3	1.7	1.4
Centrally Planned Eur.	5.9	10.3	12.3	14.0	11.5	10.1
Centrally Planned Asia	.0	1.2	4.7	9.8	11.7	13.3
Middle East	1.5	2.3	4.2	4.9	4.9	5.1
Africa	.5	1.1	1.7	2.4	2.8	3.4
Latin America	.5	.3	.5	2.7	4.1	4.5
South and East Asia	.3	1.1	3.8	8.1	10.9	13.6
TOTAL	13.9	27.5	40.5	55.1	55.4	57.4

ELECTRICITY SOLIDS CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	14.7	12.4	11.5	11.8	12.6	12.0
OECD Europe-Canada	4.0	4.3	6.0	7.5	8.0	7.5
OECD Pacific	2.0	2.1	3.1	4.0	4.5	4.6
Centrally Planned Eur.	17.3	17.8	20.8	24.5	30.5	32.7
Centrally Planned Asia	3.5	5.4	10.1	16.8	31.1	43.0
Middle East	.0	.3	2.5	4.2	6.6	8.2
Africa	1.5	1.9	2.9	4.2	7.4	11.0
Latin America	.1	.0	.4	4.9	10.7	14.6
South and East Asia	1.6	2.8	6.8	13.8	28.8	43.7
TOTAL	44.7	47.0	64.1	91.7	140.2	177.3

ELECTRICITY HYDRO CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.3	3.8	4.3	4.6	4.7	4.8
OECD Europe-Canada	8.2	9.6	10.6	11.0	11.1	11.1
OECD Pacific	1.2	1.3	1.3	1.4	1.4	1.4
Centrally Planned Eur.	2.5	3.1	3.6	3.7	3.7	3.7
Centrally Planned Asia	1.0	2.3	6.4	10.0	11.3	11.6
Middle East	.1	.2	.4	.6	.7	.7
Africa	.2	.4	1.3	3.2	5.3	6.6
Latin America	3.3	6.9	14.9	19.2	20.4	20.6
South and East Asia	1.4	2.6	5.9	9.4	11.4	12.1
TOTAL	21.2	30.2	48.7	63.1	70.0	72.6

ENERGY REPORT: 2060 LOW EMISSIONS - HIGHER GROWTH

ELECTRICITY NUCLEAR CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.9	4.2	5.1	5.8	6.9	6.2
OECD Europe-Canada	6.7	7.0	7.4	7.5	8.7	7.8
OECD Pacific	1.8	2.3	2.5	2.5	3.1	3.0
Centrally Planned Eur.	2.6	3.4	7.6	12.3	16.7	16.8
Centrally Planned Asia	.0	.1	3.3	8.5	17.1	22.1
Middle East	.0	.0	1.2	4.2	7.1	8.4
Africa	.0	.0	.8	2.1	4.1	5.7
Latin America	.0	.0	.2	2.4	5.9	7.5
South and East Asia	.2	.4	2.3	7.0	15.8	22.5
TOTAL	15.2	17.4	30.4	52.3	85.4	100.0

ELECTRICITY SOLAR CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.4	1.5	2.7	3.4	3.3
OECD Europe-Canada	.0	.3	.9	1.8	2.1	2.0
OECD Pacific	.0	.1	.5	.9	1.2	1.3
Centrally Planned Eur.	.0	.5	2.4	5.8	8.1	8.9
Centrally Planned Asia	.0	.1	1.1	4.0	8.3	11.7
Middle East	.0	.0	.5	2.0	3.5	4.4
Africa	.0	.0	.3	1.0	2.0	3.0
Latin America	.0	.0	.0	1.1	2.9	4.0
South and East Asia	.0	.0	.8	3.3	7.7	11.9
TOTAL	.0	1.4	8.0	22.6	39.2	50.5

TOTAL ELECTRIC UTILITY ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	27.1	30.3	31.7	33.6	34.5	31.8
OECD Europe-Canada	21.3	25.5	30.4	33.5	34.2	31.8
OECD Pacific	6.8	8.2	10.3	11.9	12.6	12.4
Centrally Planned Eur.	33.2	40.1	50.9	64.9	75.5	77.1
Centrally Planned Asia	5.3	10.4	27.5	52.3	84.6	108.1
Middle East	2.8	4.1	10.3	17.5	24.9	29.2
Africa	2.6	3.9	7.6	13.7	22.8	31.3
Latin America	4.3	7.3	16.2	31.4	45.8	53.4
South and East Asia	4.2	8.0	21.2	44.2	79.3	110.3
TOTAL	107.6	137.8	206.1	303.0	414.2	485.4

TABLE A-87

ENERGY CONVERSION EFFICIENCY AT ELECTRIC UTILITY POWERPLANTS
(percent)

REGION	1985	2000	2025	2050	2075	2100
United States	31.7	33.0	35.0	36.3	37.7	38.1
OECD Europe-Canada	32.4	32.5	34.5	35.5	36.3	36.2
OECD Pacific	30.9	32.9	35.0	36.1	38.1	37.9
Centrally Planned Eur.	31.6	33.2	35.2	37.0	38.1	38.4
Centrally Planned Asia	26.4	29.8	33.5	36.1	37.8	38.1
Middle East	25.0	29.3	35.0	37.1	37.8	37.3
Africa	23.1	30.8	32.9	36.5	37.7	37.7
Latin America	30.2	31.5	32.7	34.7	36.5	36.5
South and East Asia	26.2	31.2	34.0	36.4	37.8	38.1

*Includes transmission and distribution losses

TABLE A-88

SYNTHETIC PRODUCTION OF OIL AND GAS

OIL FROM SYNFUELS
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.2	2.5	8.4	14.6
OECD Europe-Canada	.0	.0	.1	.7	3.4	5.9
OECD Pacific	.0	.0	.0	.6	1.8	3.2
Centrally Planned Eur.	.0	.0	.4	4.2	18.0	41.3
Centrally Planned Asia	.0	.0	.5	4.7	17.2	30.8
Middle East	.0	.0	.0	.0	.0	.0
Africa	.0	.0	.0	.3	1.0	2.2
Latin America	.0	.0	.0	.3	.4	.4
South and East Asia	.0	.0	.1	.4	.6	.8
TOTAL	.0	.0	1.3	13.7	50.8	99.2

GAS FROM SYNFUELS
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.2	2.1	5.7	9.6
OECD Europe-Canada	.0	.0	.1	1.5	3.5	5.2
OECD Pacific	.0	.0	.0	.8	1.8	2.7
Centrally Planned Eur.	.0	.0	.3	3.9	11.1	23.1
Centrally Planned Asia	.0	.0	.2	1.9	7.1	15.2
Middle East	.0	.0	.0	.0	.1	.1
Africa	.0	.0	.4	5.0	10.3	11.7
Latin America	.0	.0	.6	7.5	14.4	15.8
South and East Asia	.0	.0	.3	3.3	6.5	7.4
TOTAL	.0	.0	2.1	26.0	60.5	90.8

TABLE A-89

ENERGY USED FOR SYNTHETIC FUEL PRODUCTION BY TYPE

COAL USED IN SYNFUEL PRODUCTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.4	3.8	15.3	29.8
OECD Europe-Canada	.0	.0	.2	1.6	6.2	12.1
OECD Pacific	.0	.0	.0	.8	3.3	6.4
Centrally Planned Eur.	.0	.0	.6	6.3	32.7	84.5
Centrally Planned Asia	.0	.0	.7	7.4	31.5	63.7
Middle East	.0	.0	.0	.0	.0	.0
Africa	.0	.0	.1	1.4	6.6	7.3
Latin America	.0	.0	.0	.4	.9	1.1
South and East Asia	.0	.0	.2	.8	1.9	2.8
TOTAL	.0	.0	2.2	22.5	98.4	207.7

BIOMASS USED IN SYNFUEL PRODUCTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.2	2.8	5.2	5.7
OECD Europe-Canada	.0	.0	.2	2.0	3.7	4.1
OECD Pacific	.0	.0	.0	1.0	1.9	2.0
Centrally Planned Eur.	.0	.0	.4	5.2	9.8	10.7
Centrally Planned Asia	.0	.0	.2	2.4	4.6	5.0
Middle East	.0	.0	.0	.0	.1	.2
Africa	.0	.0	.5	6.8	12.8	14.0
Latin America	.0	.0	.8	10.2	19.2	21.0
South and East Asia	.0	.0	.4	4.5	8.4	9.2
TOTAL	.0	.0	2.7	34.9	65.7	71.9

TOTAL USED IN SYNFUEL PRODUCTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.6	6.6	20.5	35.5
OECD Europe-Canada	.0	.0	.4	3.6	9.9	16.2
OECD Pacific	.0	.0	.0	1.8	5.2	8.4
Centrally Planned Eur.	.0	.0	1.0	11.5	42.5	95.2
Centrally Planned Asia	.0	.0	.9	9.8	36.1	68.7
Middle East	.0	.0	.0	.0	.1	.2
Africa	.0	.0	.6	8.2	19.4	21.3
Latin America	.0	.0	.8	10.6	20.1	22.1
South and East Asia	.0	.0	.6	5.3	10.3	12.0
TOTAL	.0	.0	4.9	57.4	164.1	279.6

TABLE A-90

CO2 EMISSIONS FROM FOSSIL FUEL
(Petagrams C/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	1.3	1.3	1.1	1.0	1.1	1.2
OECD Europe-Canada	.8	.8	.7	.7	.7	.7
OECD Pacific	.3	.3	.3	.3	.3	.4
Centrally Planned Eur.	1.4	1.5	1.7	1.9	2.3	3.0
Centrally Planned Asia	.5	.7	1.4	2.1	2.9	3.6
Middle East	.1	.2	.4	.6	.7	.7
Africa	.1	.2	.4	.5	.6	.8
Latin America	.2	.3	.5	.8	1.0	1.1
South and East Asia	.3	.4	.8	1.3	2.0	2.5
TOTAL	5.1	5.8	7.2	9.2	11.4	13.8

TABLE A-91

CO EMISSIONS FROM FOSSIL FUEL
(Teragrams C/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	51.0	26.4	9.6	7.2	6.5	7.0
OECD Europe-Canada	39.0	28.8	6.7	5.3	4.7	5.3
OECD Pacific	13.2	10.6	2.6	2.2	2.1	2.5
Centrally Planned Eur.	35.0	36.2	26.5	10.8	11.3	14.2
Centrally Planned Asia	4.7	6.0	8.9	7.4	10.1	13.7
Middle East	4.2	4.3	5.9	3.0	3.6	4.9
Africa	8.1	9.6	12.4	5.5	6.2	7.4
Latin America	16.7	17.4	18.2	8.5	9.7	12.0
South and East Asia	10.2	10.3	10.4	7.1	10.2	15.1
TOTAL	182.0	149.8	101.2	57.1	64.5	82.1

TABLE A-92

NOX EMISSIONS FROM FOSSIL FUEL
(Teragrams N/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	6.3	5.4	2.6	1.9	1.7	1.9
OECD Europe-Canada	3.9	3.6	1.8	1.4	1.3	1.4
OECD Pacific	1.5	1.4	.7	.6	.6	.7
Centrally Planned Eur.	6.1	6.4	4.6	3.3	3.4	4.2
Centrally Planned Asia	2.0	3.1	5.2	3.7	4.2	4.9
Middle East	.5	.7	1.3	1.2	1.1	1.3
Africa	.8	1.1	1.7	1.6	1.8	2.1
Latin America	1.1	1.5	2.1	2.5	2.8	3.1
South and East Asia	1.1	1.8	2.9	2.8	3.4	4.3
TOTAL	23.2	25.0	22.9	19.0	20.4	24.0

TABLE A-93

PRIMARY ENERGY SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	66.8	54.1	47.6	42.1	39.9	43.2
OECD Europe-Canada	47.4	44.8	49.6	46.6	41.3	40.5
OECD Pacific	8.9	9.9	9.9	10.0	10.3	11.5
Centrally Planned Eur.	80.1	82.0	90.5	84.6	72.7	72.5
Centrally Planned Asia	26.7	28.9	43.1	54.0	51.8	55.7
Middle East	24.9	44.4	63.6	57.4	44.7	38.3
Africa	17.2	21.4	26.0	34.4	33.5	36.5
Latin America	21.2	21.4	25.1	42.0	43.9	52.5
South and East Asia	21.7	16.0	18.6	26.4	32.4	41.8
TOTAL	314.9	322.9	374.0	397.5	370.5	392.5

TABLE A-94

PRIMARY OIL SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	22.7	12.2	5.7	4.6	2.8	2.4
OECD Europe-Canada	12.4	9.1	7.1	5.9	3.7	2.2
OECD Pacific	1.2	.6	.2	.0	.0	.0
Centrally Planned Eur.	26.5	20.8	16.3	12.5	7.6	4.4
Centrally Planned Asia	5.4	6.4	6.0	5.3	3.3	1.9
Middle East	23.3	41.3	52.6	41.3	25.3	15.8
Africa	11.3	15.4	17.1	17.3	11.3	6.9
Latin America	14.7	10.6	9.5	15.1	10.4	10.0
South and East Asia	11.1	5.8	2.8	2.0	1.2	.8
TOTAL	128.6	122.2	117.3	104.0	65.6	44.4

TABLE A-95

PRIMARY GAS SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	17.2	15.3	11.1	7.1	4.4	2.9
OECD Europe-Canada	9.6	8.7	10.6	8.5	5.5	3.1
OECD Pacific	.7	1.5	1.6	1.0	.6	.3
Centrally Planned Eur.	23.4	27.8	31.3	25.9	13.3	6.0
Centrally Planned Asia	.5	1.4	3.5	3.5	2.0	1.5
Middle East	1.5	2.9	9.5	13.3	15.2	17.2
Africa	1.7	2.5	4.3	4.0	2.9	3.1
Latin America	2.6	4.5	7.0	6.2	3.6	2.6
South and East Asia	2.9	1.9	2.4	1.0	1.9	2.7
TOTAL	60.1	66.5	81.3	70.5	49.4	39.4

TABLE A-96

PRIMARY COAL SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	19.7	18.1	19.6	16.8	10.4	9.7
OECD Europe-Canada	10.3	9.8	12.6	12.5	7.6	6.2
OECD Pacific	3.9	4.2	4.7	4.9	3.2	2.7
Centrally Planned Eur.	25.1	26.6	30.9	27.8	17.5	16.6
Centrally Planned Asia	19.8	18.8	25.7	30.7	23.8	20.1
Middle East	.0	.0	.0	.0	.0	.0
Africa	4.0	3.1	3.1	3.3	2.8	2.9
Latin America	.6	.9	1.3	1.7	1.4	1.1
South and East Asia	6.1	5.5	7.1	9.1	6.9	4.4
TOTAL	89.5	87.0	105.0	106.8	73.6	63.7

TABLE A-97

PRIMARY BIOMASS SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.0	2.6	4.7	6.7
OECD Europe-Canada	.0	.0	.0	1.9	3.3	4.8
OECD Pacific	.0	.0	.0	.9	1.7	2.4
Centrally Planned Eur.	.0	.0	.0	4.9	8.7	12.5
Centrally Planned Asia	.0	.0	.0	2.3	4.1	5.9
Middle East	.0	.0	.0	.0	.1	.2
Africa	.0	.0	.0	6.5	11.4	16.4
Latin America	.0	.0	.0	9.7	17.0	24.6
South and East Asia	.0	.0	.0	4.3	7.5	10.8
TOTAL	.0	.0	.0	33.1	58.5	84.3

TABLE A-98

PRIMARY HYDROELECTRIC SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.3	3.8	4.3	4.6	4.7	4.8
OECD Europe-Canada	8.2	9.6	10.6	11.0	11.1	11.1
OECD Pacific	1.2	1.3	1.3	1.4	1.4	1.4
Centrally Planned Eur.	2.5	3.1	3.6	3.7	3.7	3.7
Centrally Planned Asia	1.0	2.3	6.4	10.0	11.3	11.6
Middle East	.1	.2	.4	.6	.7	.7
Africa	.2	.4	1.3	3.2	5.1	6.6
Latin America	3.3	5.4	7.3	9.3	11.5	14.2
South and East Asia	1.4	2.6	5.9	9.4	11.4	12.1
TOTAL	21.2	28.7	41.1	53.2	60.9	66.2

TABLE A-99

PRIMARY NUCLEAR SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.9	4.3	5.4	4.4	8.8	11.4
OECD Europe-Canada	6.9	7.3	7.7	5.5	7.2	8.9
OECD Pacific	1.9	2.2	1.8	1.3	2.3	3.2
Centrally Planned Eur.	2.6	3.2	6.4	6.7	15.0	20.0
Centrally Planned Asia	.0	.0	1.1	1.5	5.0	10.0
Middle East	.0	.0	.8	1.5	2.3	3.0
Africa	.0	.0	.2	.1	.0	.4
Latin America	.0	.0	.0	.0	.0	.0
South and East Asia	.2	.2	.3	.4	2.4	7.5
TOTAL	15.5	17.2	23.7	21.4	43.0	64.4

TABLE A-100

PRIMARY SOLAR SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.4	1.5	2.0	4.1	5.3
OECD Europe-Canada	.0	.3	1.0	1.3	2.9	4.2
OECD Pacific	.0	.1	.3	.5	1.1	1.5
Centrally Planned Eur.	.0	.5	2.0	3.1	6.9	9.3
Centrally Planned Asia	.0	.0	.4	.7	2.3	4.7
Middle East	.0	.0	.3	.7	1.1	1.4
Africa	.0	.0	.0	.0	.0	.2
Latin America	.0	.0	.0	.0	.0	.0
South and East Asia	.0	.0	.1	.2	1.1	3.5
TOTAL	.0	1.3	5.6	8.5	19.5	30.1

ENERGY REPORT: CONTROL POLICIES - LOWER GROWTH

TABLE A-101

PRIMARY ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	77.2	79.0	76.2	69.7	59.0	57.7
OECD Europe-Canada	58.6	61.3	65.3	61.5	51.9	51.2
OECD Pacific	17.8	18.4	16.8	17.0	15.1	16.2
Centrally Planned Eur.	72.7	82.1	95.3	98.4	88.8	88.8
Centrally Planned Asia	19.2	26.4	40.5	52.4	51.3	56.6
Middle East	8.5	9.9	21.6	22.4	17.0	15.5
Africa	7.2	8.5	9.7	12.9	14.6	18.7
Latin America	15.9	19.3	24.5	29.4	30.6	34.2
South and East Asia	13.9	17.7	24.1	33.8	41.4	54.8
TOTAL	291.0	322.6	374.0	397.5	369.7	393.7

TABLE A-102

SECONDARY ENERGY CONSUMPTION: FUEL VERSUS ELECTRICITY

FUEL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	50.1	48.3	40.7	36.8	29.3	26.8
OECD Europe-Canada	36.9	35.4	32.9	29.6	22.1	19.9
OECD Pacific	10.8	10.8	9.0	8.6	7.1	7.2
Centrally Planned Eur.	39.6	43.8	48.8	50.7	42.6	39.4
Centrally Planned Asia	13.8	18.4	26.3	31.9	25.5	21.5
Middle East	5.6	6.6	13.9	14.1	9.9	8.3
Africa	4.5	5.4	6.4	7.1	6.5	6.9
Latin America	11.5	13.9	17.2	17.7	15.0	13.8
South and East Asia	9.6	12.2	15.8	20.5	21.7	23.8
TOTAL	182.4	194.8	211.0	217.0	179.7	167.6

ELECTRICITY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	8.6	10.1	12.3	11.6	10.2	10.2
OECD Europe-Canada	7.1	8.6	11.1	11.0	10.2	10.4
OECD Pacific	2.3	2.4	2.7	2.9	2.7	2.9
Centrally Planned Eur.	10.4	12.6	16.2	16.8	15.9	16.2
Centrally Planned Asia	1.5	2.4	4.6	6.9	8.6	11.4
Middle East	.8	1.0	2.6	2.9	2.5	2.5
Africa	.7	.9	1.1	1.4	1.7	2.5
Latin America	1.4	1.8	2.4	3.1	3.8	4.7
South and East Asia	1.2	1.7	2.7	4.0	6.0	9.7
TOTAL	34.0	41.5	55.7	60.6	61.6	70.5

TOTAL ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	58.7	58.4	53.0	48.4	39.5	37.0
OECD Europe-Canada	44.0	44.0	44.0	40.6	32.3	30.3
OECD Pacific	13.1	13.2	11.7	11.5	9.8	10.1
Centrally Planned Eur.	50.0	56.4	65.0	67.5	58.5	55.6
Centrally Planned Asia	15.3	20.8	30.9	38.8	34.1	32.9
Middle East	6.4	7.6	16.5	17.0	12.4	10.8
Africa	5.2	6.3	7.5	8.5	8.2	9.4
Latin America	12.9	15.7	19.6	20.8	18.8	18.5
South and East Asia	10.8	13.9	18.5	24.5	27.7	33.5
TOTAL	216.4	236.3	266.7	277.6	241.3	238.1

TABLE A-103

SECONDARY OIL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	31.6	29.9	21.7	17.9	14.4	15.0
OECD Europe-Canada	25.3	24.0	20.3	16.7	12.7	12.7
OECD Pacific	8.2	7.9	6.0	5.5	4.6	5.1
Centrally Planned Eur.	16.0	17.3	18.8	17.8	15.7	17.4
Centrally Planned Asia	3.0	3.6	4.6	5.6	5.4	6.7
Middle East	4.8	5.4	10.5	9.7	6.7	5.9
Africa	2.8	3.3	3.8	3.6	3.1	3.5
Latin America	9.1	10.8	12.0	11.1	9.1	8.9
South and East Asia	5.9	7.1	7.9	9.3	9.8	11.9
TOTAL	106.7	109.3	105.6	97.2	81.5	87.1

TABLE A-104

SECONDARY GAS CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	14.7	14.0	14.5	14.9	11.9	9.5
OECD Europe-Canada	7.1	6.6	7.7	8.1	6.0	4.7
OECD Pacific	.8	.9	1.0	1.1	.9	.8
Centrally Planned Eur.	14.1	18.1	22.1	25.4	21.9	18.4
Centrally Planned Asia	.1	.2	.4	.7	.7	.7
Middle East	.8	1.2	3.4	4.4	3.2	2.4
Africa	.5	.5	.6	.8	.8	1.0
Latin America	1.8	2.3	3.8	5.0	4.6	4.0
South and East Asia	1.0	1.3	2.0	3.4	4.2	4.9
TOTAL	40.9	45.1	55.5	63.8	54.2	46.4

TABLE A-105

SECONDARY SOLIDS CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.8	4.4	4.5	4.0	3.0	2.3
OECD Europe-Canada	4.5	4.8	4.9	4.8	3.4	2.5
OECD Pacific	1.8	2.0	2.0	2.0	1.6	1.3
Centrally Planned Eur.	9.5	8.4	7.9	7.5	5.0	3.6
Centrally Planned Asia	10.7	14.6	21.3	25.6	19.4	14.1
Middle East	.0	.0	.0	.0	.0	.0
Africa	1.2	1.6	2.0	2.7	2.6	2.4
Latin America	.6	.8	1.4	1.6	1.3	.9
South and East Asia	2.7	3.8	5.9	7.8	7.7	7.0
TOTAL	34.8	40.4	49.9	56.0	44.0	34.1

TABLE A-106

RESIDENTIAL/COMMERCIAL ENERGY CONSUMPTION: FUEL VERSUS ELECTRICITY

FUEL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	11.4	9.6	7.7	7.2	5.6	4.5
OECD Europe-Canada	11.0	9.5	8.4	7.2	4.9	3.6
OECD Pacific	1.5	1.5	1.4	1.1	.8	.7
Centrally Planned Eur.	14.7	15.1	19.1	20.6	17.6	15.2
Centrally Planned Asia	3.4	3.9	4.6	6.2	5.2	4.4
Middle East	.3	.5	1.4	1.5	1.2	1.0
Africa	.4	.6	1.1	1.4	1.4	1.4
Latin America	1.6	1.9	2.4	2.6	2.4	2.1
South and East Asia	2.0	2.5	3.2	4.3	4.6	5.0
TOTAL	46.3	45.1	49.3	52.1	43.7	37.9

ELECTRICITY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	5.7	6.8	8.4	8.0	6.8	6.6
OECD Europe-Canada	3.9	4.6	6.0	5.6	4.6	4.2
OECD Pacific	1.1	1.2	1.5	1.5	1.3	1.3
Centrally Planned Eur.	2.9	3.2	4.8	5.0	4.6	4.8
Centrally Planned Asia	.2	.4	.9	1.5	1.9	2.6
Middle East	.2	.2	.8	1.0	.8	.9
Africa	.3	.4	.5	.6	.8	1.1
Latin America	.5	.7	.9	1.2	1.4	1.7
South and East Asia	.4	.6	1.1	1.6	2.3	3.6
TOTAL	15.2	18.1	24.9	26.0	24.5	26.8

TOTAL ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	17.1	16.4	16.1	15.2	12.4	11.1
OECD Europe-Canada	14.9	14.1	14.4	12.8	9.5	7.8
OECD Pacific	2.6	2.7	2.9	2.6	2.1	2.0
Centrally Planned Eur.	17.6	18.3	23.9	25.6	22.2	20.0
Centrally Planned Asia	3.6	4.3	5.5	7.7	7.1	7.0
Middle East	.5	.7	2.2	2.5	2.0	1.9
Africa	.7	1.0	1.6	2.0	2.2	2.5
Latin America	2.1	2.6	3.3	3.8	3.8	3.8
South and East Asia	2.4	3.1	4.3	5.9	6.9	8.6
TOTAL	61.5	63.2	74.2	78.1	68.2	64.7

TABLE A-107

INDUSTRIAL ENERGY CONSUMPTION: FUEL VERSUS ELECTRICITY

FUEL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	17.6	17.9	17.2	15.8	12.1	9.4
OECD Europe-Canada	12.3	11.8	10.9	10.4	7.6	5.9
OECD Pacific	4.6	4.5	3.5	3.5	2.7	2.2
Centrally Planned Eur.	16.1	16.4	14.8	15.4	11.5	8.6
Centrally Planned Asia	9.4	13.1	19.3	22.3	16.5	11.7
Middle East	4.2	4.8	9.4	9.4	6.1	4.4
Africa	2.0	2.2	2.0	2.6	2.5	2.5
Latin America	5.6	6.7	8.1	8.9	7.2	5.7
South and East Asia	5.0	6.4	8.1	10.9	11.2	10.8
TOTAL	76.8	83.8	93.3	99.2	77.4	61.2

ELECTRICITY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	2.9	3.3	3.9	3.6	3.4	3.6
OECD Europe-Canada	3.0	3.8	4.8	5.1	5.2	5.7
OECD Pacific	1.1	1.2	1.2	1.4	1.4	1.6
Centrally Planned Eur.	7.4	9.3	11.3	11.7	11.1	11.2
Centrally Planned Asia	1.3	2.0	3.7	5.3	6.5	8.4
Middle East	.6	.8	1.8	1.9	1.7	1.6
Africa	.4	.5	.6	.8	.9	1.4
Latin America	.9	1.1	1.5	1.9	2.4	3.0
South and East Asia	.8	1.1	1.6	2.4	3.7	5.9
TOTAL	18.4	23.1	30.4	34.1	36.3	42.4

TOTAL ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	20.5	21.2	21.1	19.4	15.5	13.0
OECD Europe-Canada	15.3	15.6	15.7	15.5	12.8	11.6
OECD Pacific	5.7	5.7	4.7	4.9	4.1	3.8
Centrally Planned Eur.	23.5	25.7	26.1	27.1	22.6	19.8
Centrally Planned Asia	10.7	15.1	23.0	27.6	23.0	20.1
Middle East	4.8	5.6	11.2	11.3	7.8	6.0
Africa	2.4	2.7	2.6	3.4	3.4	3.9
Latin America	6.5	7.8	9.6	10.8	9.6	8.7
South and East Asia	5.8	7.5	9.7	13.3	14.9	16.7
TOTAL	95.2	106.9	123.7	133.3	113.7	103.6

TABLE A-108

TRANSPORTATION ENERGY CONSUMPTION: FUEL VERSUS ELECTRICITY

FUEL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	21.1	20.8	15.8	13.8	11.6	12.9
OECD Europe-Canada	13.6	14.1	13.6	12.0	9.6	10.4
OECD Pacific	4.7	4.8	4.1	4.0	3.6	4.3
Centrally Planned Eur.	8.8	12.3	14.9	14.7	13.5	15.6
Centrally Planned Asia	1.0	1.4	2.4	3.4	3.8	5.4
Middle East	1.1	1.3	3.1	3.2	2.6	2.9
Africa	2.1	2.6	3.3	3.1	2.6	3.0
Latin America	4.3	5.3	6.7	6.2	5.4	6.0
South and East Asia	2.6	3.3	4.5	5.3	5.9	8.0
TOTAL	59.3	65.9	68.4	65.7	58.6	68.5

ELECTRICTY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.0	.0	.0	.0
OECD Europe-Canada	.2	.2	.3	.3	.4	.5
OECD Pacific	.1	.0	.0	.0	.0	.0
Centrally Planned Eur.	.1	.1	.1	.1	.2	.2
Centrally Planned Asia	.0	.0	.0	.1	.2	.4
Middle East	.0	.0	.0	.0	.0	.0
Africa	.0	.0	.0	.0	.0	.0
Latin America	.0	.0	.0	.0	.0	.0
South and East Asia	.0	.0	.0	.0	.0	.2
TOTAL	.4	.3	.4	.5	.8	1.3

TOTAL ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	21.1	20.8	15.8	13.8	11.6	12.9
OECD Europe-Canada	13.8	14.3	13.9	12.3	10.0	10.9
OECD Pacific	4.8	4.8	4.1	4.0	3.6	4.3
Centrally Planned Eur.	8.9	12.4	15.0	14.8	13.7	15.8
Centrally Planned Asia	1.0	1.4	2.4	3.5	4.0	5.8
Middle East	1.1	1.3	3.1	3.2	2.6	2.9
Africa	2.1	2.6	3.3	3.1	2.6	3.0
Latin America	4.3	5.3	6.7	6.2	5.4	6.0
South and East Asia	2.6	3.3	4.5	5.3	5.9	8.2
TOTAL	59.7	66.2	68.8	66.2	59.4	69.8

TABLE A-109

ELECTRIC UTILITY ENERGY CONSUMPTION

ELECTRICITY OIL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	1.3	2.3	2.9	2.3	1.1	.8
OECD Europe-Canada	1.5	1.7	1.9	1.5	.8	.6
OECD Pacific	1.4	1.1	.7	.6	.3	.2
Centrally Planned Eur.	4.9	4.8	4.4	3.6	1.8	1.3
Centrally Planned Asia	.8	1.0	.8	.8	.6	.7
Middle East	1.2	1.0	1.3	.9	.3	.2
Africa	.4	.4	.2	.0	.0	.0
Latin America	.4	.0	.0	.0	.0	.0
South and East Asia	.7	.6	.3	.2	.3	.5
TOTAL	12.6	12.9	12.5	9.9	5.2	4.3

ELECTRICITY GAS CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.9	6.2	6.6	7.2	4.4	2.8
OECD Europe-Canada	1.0	2.0	3.6	4.5	3.1	2.2
OECD Pacific	.4	.8	1.2	1.7	1.2	.8
Centrally Planned Eur.	5.9	8.5	9.3	11.0	7.4	4.9
Centrally Planned Asia	.0	.5	1.3	2.5	2.4	2.5
Middle East	1.5	1.8	2.9	2.5	1.2	.7
Africa	.5	.7	.4	.2	.0	.0
Latin America	.5	.0	.0	.0	.0	.0
South and East Asia	.3	.5	.4	.6	1.2	1.9
TOTAL	14.0	21.0	25.7	30.2	20.9	15.8

ELECTRICITY SOLIDS CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	14.7	13.7	14.6	11.8	5.2	3.6
OECD Europe-Canada	4.1	4.9	7.6	7.2	3.7	2.8
OECD Pacific	2.1	2.1	2.6	2.7	1.4	1.0
Centrally Planned Eur.	17.3	18.2	20.9	17.9	8.9	6.3
Centrally Planned Asia	3.5	4.2	4.2	4.0	2.9	3.2
Middle East	.0	.2	2.0	2.1	1.5	.9
Africa	1.5	1.5	1.0	.4	.0	.1
Latin America	.1	.0	.0	.0	.0	.0
South and East Asia	1.6	1.6	1.2	1.0	1.4	2.4
TOTAL	44.9	46.4	54.1	47.1	25.0	20.3

ELECTRICITY HYDRO CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.3	3.8	4.3	4.6	4.7	4.8
OECD Europe-Canada	8.2	9.6	10.6	11.0	11.1	11.1
OECD Pacific	1.2	1.3	1.3	1.4	1.4	1.4
Centrally Planned Eur.	2.5	3.1	3.6	3.7	3.7	3.7
Centrally Planned Asia	1.0	2.3	6.4	10.0	11.3	11.6
Middle East	.1	.2	.4	.6	.7	.7
Africa	.2	.4	1.3	3.2	5.1	6.6
Latin America	3.3	5.4	7.3	9.3	11.5	14.2
South and East Asia	1.4	2.6	5.9	9.4	11.4	12.1
TOTAL	21.2	28.7	41.1	53.2	60.9	66.2

ENERGY REPORT: CONTROL POLICIES - LOWER GROWTH

ELECTRICITY NUCLEAR CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.9	4.3	5.4	4.4	8.8	11.4
OECD Europe-Canada	6.9	7.3	7.7	5.5	7.2	8.9
OECD Pacific	1.9	2.2	1.8	1.3	2.3	3.2
Centrally Planned Eur.	2.6	3.2	6.4	6.7	15.0	20.0
Centrally Planned Asia	.0	.0	1.1	1.5	5.0	10.0
Middle East	.0	.0	.8	1.5	2.3	3.0
Africa	.0	.0	.2	.1	.0	.4
Latin America	.0	.0	.0	.0	.0	.0
South and East Asia	.2	.2	.3	.4	2.4	7.5
TOTAL	15.5	17.2	23.7	21.4	43.0	64.4

ELECTRICITY SOLAR CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.4	1.5	2.0	4.1	5.3
OECD Europe-Canada	.0	.3	1.0	1.3	2.9	4.2
OECD Pacific	.0	.1	.3	.5	1.1	1.5
Centrally Planned Eur.	.0	.5	2.0	3.1	6.9	9.3
Centrally Planned Asia	.0	.0	.4	.7	2.3	4.7
Middle East	.0	.0	.3	.7	1.1	1.4
Africa	.0	.0	.0	.0	.0	.2
Latin America	.0	.0	.0	.0	.0	.0
South and East Asia	.0	.0	.1	.2	1.1	3.5
TOTAL	.0	1.3	5.6	8.5	19.5	30.1

TOTAL ELECTRIC UTILITY ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	27.1	30.7	35.3	32.3	28.3	28.7
OECD Europe-Canada	21.7	25.8	32.4	31.0	28.8	29.8
OECD Pacific	7.0	7.6	7.9	8.2	7.7	8.1
Centrally Planned Eur.	33.2	38.3	46.6	46.0	43.7	45.5
Centrally Planned Asia	5.3	8.0	14.2	19.5	24.5	32.7
Middle East	2.8	3.2	7.7	8.3	7.1	6.9
Africa	2.6	3.0	3.1	3.9	5.1	7.3
Latin America	4.3	5.4	7.3	9.3	11.5	14.2
South and East Asia	4.2	5.5	8.2	11.8	17.8	27.9
TOTAL	108.2	127.5	162.7	170.3	174.5	201.1

TABLE A-110

ENERGY CONVERSION EFFICIENCY AT ELECTRIC UTILITY POWERPLANTS
(percent)

REGION	1985	2000	2025	2050	2075	2100
United States	31.7	32.9	34.6	36.5	36.4	35.2
OECD Europe-Canada	32.7	32.9	34.3	35.2	35.4	35.2
OECD Pacific	32.9	31.6	35.4	36.6	37.7	34.6
Centrally Planned Eur.	31.6	32.9	35.0	36.3	36.4	35.6
Centrally Planned Asia	26.4	30.0	33.1	34.9	35.9	34.9
Middle East	25.0	28.1	33.8	34.9	36.6	34.8
Africa	23.1	26.7	29.0	30.8	33.3	31.5
Latin America	30.2	33.3	32.9	33.3	33.0	33.1
South and East Asia	26.2	30.9	31.7	33.1	34.8	34.4

*Includes transmission and distribution losses

TABLE A-111

SYNTHETIC PRODUCTION OF OIL AND GAS

OIL FROM SYNFUELS
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.0	.5	1.9	4.2
OECD Europe-Canada	.0	.0	.0	.2	1.3	2.8
OECD Pacific	.0	.0	.0	.1	.7	1.4
Centrally Planned Eur.	.0	.0	.2	.8	3.5	7.7
Centrally Planned Asia	.0	.0	.1	.8	2.3	4.8
Middle East	.0	.0	.0	.0	.0	.0
Africa	.0	.0	.0	.3	3.6	8.1
Latin America	.0	.0	.0	.4	5.4	12.0
South and East Asia	.0	.0	.0	.2	2.5	5.5
TOTAL	.0	.0	.3	3.3	21.2	46.5

GAS FROM SYNFUELS
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.0	1.9	2.0	1.8
OECD Europe-Canada	.0	.0	.0	1.3	1.5	1.3
OECD Pacific	.0	.0	.0	.7	.7	.6
Centrally Planned Eur.	.0	.0	.0	3.5	3.8	3.3
Centrally Planned Asia	.0	.0	.0	1.7	1.8	1.6
Middle East	.0	.0	.0	.0	.0	.0
Africa	.0	.0	.0	4.6	5.0	4.4
Latin America	.0	.0	.0	6.9	7.5	6.6
South and East Asia	.0	.0	.0	3.0	3.3	2.9
TOTAL	.0	.0	.0	23.6	25.6	22.5

TABLE A-112

ENERGY USED FOR SYNTHETIC FUEL PRODUCTION BY TYPE

COAL USED IN SYNFUEL PRODUCTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.1	.6	.7	1.4
OECD Europe-Canada	.0	.0	.0	.4	.5	.9
OECD Pacific	.0	.0	.0	.2	.2	.4
Centrally Planned Eur.	.0	.0	.2	1.0	1.1	2.4
Centrally Planned Asia	.0	.0	.2	1.1	1.5	2.9
Middle East	.0	.0	.0	.0	.0	.0
Africa	.0	.0	.0	.1	.2	.4
Latin America	.0	.0	.0	.0	.0	.2
South and East Asia	.0	.0	.0	.3	.4	.6
TOTAL	.0	.0	.5	3.7	4.6	9.2

BIOMASS USED IN SYNFUEL PRODUCTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.0	2.6	4.7	6.7
OECD Europe-Canada	.0	.0	.0	1.9	3.3	4.8
OECD Pacific	.0	.0	.0	.9	1.7	2.4
Centrally Planned Eur.	.0	.0	.0	4.9	8.7	12.5
Centrally Planned Asia	.0	.0	.0	2.3	4.1	5.9
Middle East	.0	.0	.0	.0	.1	.2
Africa	.0	.0	.0	6.5	11.4	16.4
Latin America	.0	.0	.0	9.7	17.0	24.6
South and East Asia	.0	.0	.0	4.3	7.5	10.8
TOTAL	.0	.0	.0	33.1	58.5	84.3

TOTAL USED IN SYNFUEL PRODUCTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.1	3.2	5.4	8.1
OECD Europe-Canada	.0	.0	.0	2.3	3.8	5.7
OECD Pacific	.0	.0	.0	1.1	1.9	2.8
Centrally Planned Eur.	.0	.0	.2	5.9	9.8	14.9
Centrally Planned Asia	.0	.0	.2	3.4	5.6	8.8
Middle East	.0	.0	.0	.0	.1	.2
Africa	.0	.0	.0	6.6	11.6	16.8
Latin America	.0	.0	.0	9.7	17.0	24.8
South and East Asia	.0	.0	.0	4.6	7.9	11.4
TOTAL	.0	.0	.5	36.8	63.1	93.5

TABLE A-113

CO2 EMISSIONS FROM FOSSIL FUEL
(Petagrams C/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	1.3	1.4	1.3	1.1	.7	.6
OECD Europe-Canada	.8	.8	.9	.8	.5	.4
OECD Pacific	.3	.3	.3	.3	.2	.2
Centrally Planned Eur.	1.4	1.5	1.7	1.6	1.0	.8
Centrally Planned Asia	.5	.6	.8	1.0	.7	.6
Middle East	.1	.2	.3	.3	.2	.2
Africa	.1	.2	.2	.1	.0	-.0
Latin America	.2	.2	.3	.2	.0	-.0
South and East Asia	.3	.3	.4	.4	.4	.4
TOTAL	5.1	5.5	6.1	5.8	3.9	3.0

TABLE A-114

CO EMISSIONS FROM FOSSIL FUEL
(Teragrams C/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	51.0	27.5	12.5	10.1	8.4	9.2
OECD Europe-Canada	39.0	32.0	10.8	8.8	7.0	7.4
OECD Pacific	13.5	10.9	3.3	2.9	2.6	3.1
Centrally Planned Eur.	35.0	36.0	29.4	11.3	10.2	11.4
Centrally Planned Asia	4.7	5.4	6.3	4.5	4.4	5.2
Middle East	4.2	3.9	6.1	2.5	2.0	2.1
Africa	8.1	7.7	6.5	2.5	2.2	2.4
Latin America	16.7	15.3	12.9	4.8	4.2	4.5
South and East Asia	10.2	9.9	9.1	4.5	4.9	6.4
TOTAL	182.3	148.5	97.0	51.9	45.9	51.7

TABLE A-115

NOX EMISSIONS FROM FOSSIL FUEL
(Teragrams N/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	6.3	5.6	3.2	2.4	1.8	1.8
OECD Europe-Canada	3.9	3.8	2.5	2.0	1.5	1.5
OECD Pacific	1.5	1.4	.8	.7	.6	.6
Centrally Planned Eur.	6.1	6.4	4.9	3.2	2.6	2.4
Centrally Planned Asia	2.0	2.6	3.2	1.9	1.5	1.5
Middle East	.5	.6	1.1	.9	.5	.5
Africa	.8	.9	.8	.7	.6	.6
Latin America	1.1	1.2	1.3	1.2	1.1	1.1
South and East Asia	1.1	1.4	1.5	1.2	1.3	1.5
TOTAL	23.3	23.9	19.3	14.2	11.5	11.6

TABLE A-116

PRIMARY ENERGY SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	66.8	54.1	51.9	67.9	72.3	67.9
OECD Europe-Canada	47.2	43.8	49.6	53.8	53.5	50.9
OECD Pacific	8.8	10.4	12.5	15.9	19.9	21.3
Centrally Planned Eur.	80.1	83.4	101.1	130.1	141.7	138.0
Centrally Planned Asia	26.7	33.1	64.5	104.8	138.1	152.1
Middle East	24.9	51.3	68.5	75.9	64.1	54.8
Africa	17.2	22.3	35.9	56.1	72.9	89.7
Latin America	21.2	23.2	41.0	80.1	101.4	123.6
South and East Asia	21.7	18.8	30.8	45.8	90.7	139.2
TOTAL	314.6	340.4	455.8	630.4	754.6	837.5

TABLE A-117

PRIMARY OIL SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	22.7	12.2	5.9	6.5	3.8	2.2
OECD Europe-Canada	12.4	9.0	7.5	6.2	3.8	2.1
OECD Pacific	1.2	.6	.2	.0	.0	.0
Centrally Planned Eur.	26.5	21.1	16.9	12.7	7.6	4.3
Centrally Planned Asia	5.4	6.5	6.7	5.3	3.2	1.8
Middle East	23.3	47.5	52.9	42.9	25.8	14.8
Africa	11.3	15.3	18.6	17.9	11.4	6.6
Latin America	14.7	10.7	10.7	23.8	15.2	9.4
South and East Asia	11.1	5.6	3.0	2.2	1.3	.8
TOTAL	128.6	128.7	122.4	117.5	72.1	42.0

TABLE A-118

PRIMARY GAS SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	17.2	15.1	10.7	8.0	4.8	3.0
OECD Europe-Canada	9.6	8.1	9.6	8.6	4.1	1.2
OECD Pacific	.7	1.6	1.5	1.1	.4	.0
Centrally Planned Eur.	23.4	27.4	32.1	26.5	13.2	5.9
Centrally Planned Asia	.5	1.8	3.0	5.0	2.7	1.2
Middle East	1.5	3.6	13.0	24.3	18.1	11.9
Africa	1.7	2.5	3.7	5.0	4.4	3.4
Latin America	2.6	4.3	6.0	7.0	4.6	2.8
South and East Asia	2.9	2.4	3.8	3.0	1.6	.9
TOTAL	60.1	66.8	83.4	88.5	53.9	30.3

TABLE A-119

PRIMARY COAL SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	19.7	17.8	21.4	31.6	25.9	16.8
OECD Europe-Canada	10.3	9.3	11.2	12.9	8.4	5.3
OECD Pacific	3.9	4.2	5.5	6.9	5.8	3.9
Centrally Planned Eur.	25.1	27.3	33.4	52.5	43.8	28.6
Centrally Planned Asia	19.8	21.9	40.9	62.0	53.8	35.0
Middle East	.0	.0	.0	.0	.0	.0
Africa	4.0	4.0	6.9	11.2	11.2	9.2
Latin America	.6	1.0	2.4	4.1	2.4	1.5
South and East Asia	6.1	7.4	11.1	7.4	4.5	3.2
TOTAL	89.5	92.9	132.8	188.6	155.8	103.5

TABLE A-120

PRIMARY BIOMASS SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	1.5	5.7	10.7	16.0
OECD Europe-Canada	.0	.0	1.1	4.0	7.6	11.4
OECD Pacific	.0	.0	.5	2.0	3.8	5.7
Centrally Planned Eur.	.0	.0	2.8	10.6	19.9	29.9
Centrally Planned Asia	.0	.0	1.3	5.0	9.4	14.1
Middle East	.0	.0	.0	.1	.3	.4
Africa	.0	.0	3.7	13.9	26.0	39.1
Latin America	.0	.0	5.5	20.8	39.0	58.7
South and East Asia	.0	.0	2.4	9.1	17.1	25.8
TOTAL	.0	.0	18.8	71.2	133.8	201.1

TABLE A-121

PRIMARY HYDROELECTRIC SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.3	3.9	4.4	4.7	4.7	4.8
OECD Europe-Canada	8.2	9.7	10.8	11.0	11.1	11.1
OECD Pacific	1.2	1.3	1.3	1.4	1.4	1.5
Centrally Planned Eur.	2.5	3.2	3.7	3.7	3.7	3.7
Centrally Planned Asia	1.0	2.6	7.6	10.8	11.5	11.6
Middle East	.1	.2	.5	.6	.7	.7
Africa	.2	.5	1.7	4.2	6.2	7.0
Latin America	3.3	7.2	16.4	20.0	20.6	20.7
South and East Asia	1.4	2.8	6.9	10.5	11.9	12.4
TOTAL	21.2	31.4	53.3	66.9	71.8	73.5

TABLE A-122

PRIMARY NUCLEAR SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.9	4.5	5.5	5.7	9.4	9.4
OECD Europe-Canada	6.7	7.4	7.8	7.4	9.1	7.4
OECD Pacific	1.8	2.5	2.7	2.5	3.6	3.8
Centrally Planned Eur.	2.6	3.7	8.1	12.0	22.5	24.5
Centrally Planned Asia	.0	.1	3.3	8.3	24.2	33.0
Middle East	.0	.0	1.3	4.0	8.1	10.1
Africa	.0	.0	.8	1.9	5.8	9.1
Latin America	.0	.0	.0	2.2	8.2	11.4
South and East Asia	.2	.4	2.3	6.8	22.8	35.9
TOTAL	15.2	18.6	31.8	50.8	113.7	144.6

TABLE A-123

PRIMARY SOLAR SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.6	2.5	5.7	13.0	15.7
OECD Europe-Canada	.0	.3	1.6	3.7	9.4	12.4
OECD Pacific	.0	.2	.8	2.0	4.9	6.4
Centrally Planned Eur.	.0	.7	4.1	12.1	31.0	41.1
Centrally Planned Asia	.0	.2	1.7	8.4	33.3	55.4
Middle East	.0	.0	.8	4.0	11.1	16.9
Africa	.0	.0	.5	2.0	7.9	15.3
Latin America	.0	.0	.0	2.2	11.4	19.1
South and East Asia	.0	.0	1.3	6.8	31.5	60.2
TOTAL	.0	2.0	13.3	46.9	153.5	242.5

TABLE A-124

PRIMARY ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	77.2	77.0	67.9	68.7	64.4	60.0
OECD Europe-Canada	58.3	58.9	58.0	59.5	56.4	52.5
OECD Pacific	17.6	19.0	19.3	21.3	21.2	21.5
Centrally Planned Eur.	72.7	84.7	101.5	127.2	136.7	137.8
Centrally Planned Asia	19.2	31.4	65.2	110.0	145.1	162.7
Middle East	8.5	12.3	26.6	39.9	47.1	50.0
Africa	7.2	10.9	21.2	36.2	51.3	65.2
Latin America	15.9	24.3	48.0	76.4	93.3	104.6
South and East Asia	13.9	22.5	48.8	91.4	139.8	182.7
TOTAL	290.5	341.0	456.5	630.6	755.3	837.0

TABLE A-125

SECONDARY ENERGY CONSUMPTION: FUEL VERSUS ELECTRICITY

FUEL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	50.1	46.7	34.8	31.1	22.8	19.0
OECD Europe-Canada	36.9	33.6	26.5	23.2	16.9	13.5
OECD Pacific	10.7	10.6	8.5	8.0	6.1	5.7
Centrally Planned Eur.	39.6	44.2	48.4	54.7	47.5	43.5
Centrally Planned Asia	13.8	20.9	36.9	51.7	44.2	35.5
Middle East	5.6	8.0	16.2	21.4	17.9	15.8
Africa	4.5	6.9	12.7	17.4	17.6	17.4
Latin America	11.5	17.1	30.2	39.1	34.1	31.2
South and East Asia	9.6	14.7	26.6	42.2	43.4	43.9
TOTAL	182.3	202.7	240.8	288.8	250.5	225.5

ELECTRICITY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	8.6	10.0	11.2	12.7	13.5	12.5
OECD Europe-Cananda	7.0	8.4	10.6	12.2	13.0	12.3
OECD Pacific	2.2	2.7	3.7	4.5	5.0	5.0
Centrally Planned Eur.	10.4	13.2	18.1	25.0	29.5	29.8
Centrally Planned Asia	1.5	3.1	9.2	20.0	34.3	42.4
Middle East	.8	1.3	3.7	6.6	10.3	11.9
Africa	.7	1.3	2.5	5.1	9.2	12.9
Latin America	1.4	2.4	5.5	10.9	17.1	20.1
South and East Asia	1.2	2.4	7.1	16.9	32.7	45.9
TOTAL	33.8	44.8	71.6	113.9	164.6	192.8

TOTAL ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	58.7	56.7	46.0	43.8	36.3	31.5
OECD Europe-Canada	43.9	42.0	37.1	35.4	29.9	25.8
OECD Pacific	12.9	13.3	12.2	12.5	11.1	10.7
Centrally Planned Eur.	50.0	57.4	66.5	79.7	77.0	73.3
Centrally Planned Asia	15.3	24.0	46.1	71.7	78.5	77.9
Middle East	6.4	9.3	19.9	28.0	28.2	27.7
Africa	5.2	8.2	15.2	22.5	26.8	30.3
Latin America	12.9	19.5	35.7	50.0	51.2	51.3
South and East Asia	10.8	17.1	33.7	59.1	76.1	89.8
TOTAL	216.1	247.5	312.4	402.7	415.1	418.3

TABLE A-126

SECONDARY OIL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	31.6	29.1	16.7	13.4	10.3	10.1
OECD Europe-Canada	25.3	22.6	14.2	11.4	8.5	8.0
OECD Pacific	8.1	7.9	5.3	4.7	3.7	4.1
Centrally Planned Eur.	16.0	17.7	16.8	17.3	15.8	17.9
Centrally Planned Asia	3.0	4.3	6.1	9.7	10.7	14.7
Middle East	4.8	6.7	11.6	14.2	11.8	10.8
Africa	2.8	4.2	7.3	8.5	8.4	9.4
Latin America	9.1	13.2	19.3	23.0	19.9	20.0
South and East Asia	5.9	8.5	11.8	17.6	18.9	23.3
TOTAL	106.6	114.2	109.1	119.8	108.0	118.3

TABLE A-127

SECONDARY GAS CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	14.7	13.2	13.8	13.6	9.7	7.2
OECD Europe-Canada	7.1	6.4	7.7	7.4	5.3	3.3
OECD Pacific	.8	.8	1.2	1.3	.9	.6
Centrally Planned Eur.	14.1	18.5	25.1	30.2	27.3	23.0
Centrally Planned Asia	.1	.3	.8	1.6	1.8	1.6
Middle East	.8	1.3	4.6	7.2	6.1	5.0
Africa	.5	.7	1.5	2.6	3.0	3.1
Latin America	1.8	2.9	8.5	13.1	12.0	10.0
South and East Asia	1.0	1.6	4.8	9.2	10.8	11.2
TOTAL	40.9	45.7	68.0	86.2	76.9	65.0

TABLE A-128

SECONDARY SOLIDS CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.8	4.4	4.3	4.1	2.8	1.7
OECD Europe-Canada	4.5	4.6	4.6	4.4	3.1	2.2
OECD Pacific	1.8	1.9	2.0	2.0	1.5	1.0
Centrally Planned Eur.	9.5	8.0	6.5	7.2	4.4	2.6
Centrally Planned Asia	10.7	16.3	30.0	40.4	31.7	19.2
Middle East	.0	.0	.0	.0	.0	.0
Africa	1.2	2.0	3.9	6.3	6.2	4.9
Latin America	.6	1.0	2.4	3.0	2.2	1.2
South and East Asia	2.7	4.6	10.0	15.4	13.7	9.4
TOTAL	34.8	42.8	63.7	82.8	65.6	42.2

TABLE A-129

RESIDENTIAL/COMMERCIAL ENERGY CONSUMPTION: FUEL VERSUS ELECTRICITY

FUEL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	11.4	8.5	4.4	4.3	3.1	2.3
OECD Europe-Canada	11.0	9.2	7.9	6.9	4.8	3.3
OECD Pacific	1.5	1.4	1.5	1.5	1.0	.9
Centrally Planned Eur.	14.7	16.1	21.8	26.3	23.2	19.8
Centrally Planned Asia	3.4	4.3	5.6	10.1	10.9	9.4
Middle East	.3	.6	1.3	2.1	2.3	2.3
Africa	.4	.8	1.4	2.4	2.9	2.8
Latin America	1.6	2.1	3.2	4.9	5.4	5.3
South and East Asia	2.0	2.7	4.1	7.2	8.3	8.3
TOTAL	46.3	45.7	51.2	65.7	61.9	54.4

ELECTRICITY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	5.7	6.3	6.7	7.4	7.5	6.9
OECD Europe-Canada	3.9	4.5	5.7	6.2	6.1	5.4
OECD Pacific	1.1	1.4	2.2	2.6	2.7	2.6
Centrally Planned Eur.	2.9	3.8	6.9	9.3	11.1	11.4
Centrally Planned Asia	.2	.4	1.0	2.8	5.9	9.2
Middle East	.2	.3	.9	1.8	3.1	4.3
Africa	.3	.5	.8	1.8	3.3	4.8
Latin America	.5	.8	1.5	3.2	5.5	7.4
South and East Asia	.4	.8	2.3	5.7	10.9	16.1
TOTAL	15.2	18.8	28.0	40.8	56.1	68.1

TOTAL ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	17.1	14.8	11.1	11.7	10.6	9.2
OECD Europe-Canada	14.9	13.7	13.6	13.1	10.9	8.7
OECD Pacific	2.6	2.8	3.7	4.1	3.7	3.5
Centrally Planned Eur.	17.6	19.9	28.7	35.6	34.3	31.2
Centrally Planned Asia	3.6	4.7	6.6	12.9	16.8	18.6
Middle East	.5	.9	2.2	3.9	5.4	6.6
Africa	.7	1.3	2.2	4.2	6.2	7.6
Latin America	2.1	2.9	4.7	8.1	10.9	12.7
South and East Asia	2.4	3.5	6.4	12.9	19.2	24.4
TOTAL	61.5	64.5	79.2	106.5	118.0	122.5

TABLE A-130

INDUSTRIAL ENERGY CONSUMPTION: FUEL VERSUS ELECTRICITY

FUEL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	17.6	18.3	18.4	17.0	11.7	8.2
OECD Europe-Canada	12.3	11.8	10.5	9.4	6.5	4.1
OECD Pacific	4.6	4.5	3.8	3.6	2.5	1.8
Centrally Planned Eur.	16.1	15.7	13.2	14.3	10.7	7.3
Centrally Planned Asia	9.4	15.0	28.0	36.2	26.0	14.7
Middle East	4.2	5.9	12.0	15.5	11.3	7.6
Africa	2.0	2.8	5.0	7.9	7.7	6.4
Latin America	5.6	9.0	17.7	22.9	17.0	11.6
South and East Asia	5.0	8.5	17.5	27.1	24.6	19.3
TOTAL	76.8	91.5	126.1	153.9	118.0	81.0

ELECTICITY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	2.9	3.7	4.5	5.3	6.0	5.6
OECD Europe-Canada	3.0	3.9	4.7	5.8	6.7	6.6
OECD Pacific	1.1	1.3	1.5	1.9	2.3	2.4
Centrally Planned Eur.	7.4	9.3	11.1	15.5	18.2	18.1
Centrally Planned Asia	1.3	2.7	8.1	16.9	27.9	32.2
Middle East	.6	1.0	2.8	4.8	7.2	7.6
Africa	.4	.8	1.7	3.3	5.9	8.0
Latin America	.9	1.6	4.0	7.7	11.6	12.6
South and East Asia	.8	1.6	4.7	11.0	21.4	29.0
TOTAL	18.4	25.9	43.1	72.2	107.2	122.1

TOTAL ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	20.5	22.0	22.9	22.3	17.7	13.8
OECD Europe-Canada	15.3	15.7	15.2	15.2	13.2	10.7
OECD Pacific	5.7	5.8	5.3	5.5	4.8	4.2
Centrally Planned Eur.	23.5	25.0	24.3	29.8	28.9	25.4
Centrally Planned Asia	10.7	17.7	36.1	53.1	53.9	46.9
Middle East	4.8	6.9	14.8	20.3	18.5	15.2
Africa	2.4	3.6	6.7	11.2	13.6	14.4
Latin America	6.5	10.6	21.7	30.6	28.6	24.2
South and East Asia	5.8	10.1	22.2	38.1	46.0	48.3
TOTAL	95.2	117.4	169.2	226.1	225.2	203.1

TABLE A-131

TRANSPORTATION ENERGY CONSUMPTION: FUEL VERSUS ELECTRICITY

FUEL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	21.1	19.9	12.0	9.8	8.0	8.5
OECD Europe-Canada	13.6	12.6	8.1	6.9	5.6	6.1
OECD Pacific	4.6	4.7	3.2	2.9	2.6	3.0
Centrally Planned Eur.	8.8	12.4	13.4	14.1	13.6	16.4
Centrally Planned Asia	1.0	1.6	3.3	5.4	7.3	11.4
Middle East	1.1	1.5	2.9	3.8	4.3	5.9
Africa	2.1	3.3	6.3	7.1	7.0	8.2
Latin America	4.3	6.0	9.3	11.3	11.7	14.3
South and East Asia	2.6	3.5	5.0	7.9	10.5	16.3
TOTAL	59.2	65.5	63.5	69.2	70.6	90.1

ELECTRICITY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.0	.0	.0	.0
OECD Europe-Canada	.1	.0	.2	.2	.2	.3
OECD Pacific	.0	.0	.0	.0	.0	.0
Centrally Planned Eur.	.1	.1	.1	.2	.2	.3
Centrally Planned Asia	.0	.0	.1	.3	.5	1.0
Middle East	.0	.0	.0	.0	.0	.0
Africa	.0	.0	.0	.0	.0	.1
Latin America	.0	.0	.0	.0	.0	.1
South and East Asia	.0	.0	.1	.2	.4	.8
TOTAL	.2	.1	.5	.9	1.3	2.6

TOTAL ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	21.1	19.9	12.0	9.8	8.0	8.5
OECD Europe-Canada	13.7	12.6	8.3	7.1	5.8	6.4
OECD Pacific	4.6	4.7	3.2	2.9	2.6	3.0
Centrally Planned Eur.	8.9	12.5	13.5	14.3	13.8	16.7
Centrally Planned Asia	1.0	1.6	3.4	5.7	7.8	12.4
Middle East	1.1	1.5	2.9	3.8	4.3	5.9
Africa	2.1	3.3	6.3	7.1	7.0	8.3
Latin America	4.3	6.0	9.3	11.3	11.7	14.4
South and East Asia	2.6	3.5	5.1	8.1	10.9	17.1
TOTAL	59.4	65.6	64.0	70.1	71.9	92.7

TABLE A-132

ELECTRIC UTILITY ENERGY CONSUMPTION

ELECTRICITY OIL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	1.3	2.3	2.3	2.2	1.2	.9
OECD Europe-Canada	1.5	1.7	1.6	1.5	.8	.7
OECD Pacific	1.4	1.2	.9	.8	.4	.3
Centrally Planned Eur.	4.9	5.3	4.5	4.8	2.7	2.2
Centrally Planned Asia	.8	1.3	1.9	3.3	2.9	3.0
Middle East	1.2	1.4	1.6	1.7	1.0	.9
Africa	.4	.6	.6	.8	.7	.8
Latin America	.4	.0	.0	1.0	1.0	1.0
South and East Asia	.7	1.1	1.6	2.7	2.8	3.3
TOTAL	12.6	14.9	15.0	18.8	13.5	13.1

ELECTRICITY GAS CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.9	5.7	5.4	5.3	3.4	2.5
OECD Europe-Canada	.9	1.7	2.9	3.5	2.4	1.9
OECD Pacific	.4	.8	1.5	1.9	1.3	1.0
Centrally Planned Eur.	5.9	8.3	9.5	11.3	8.1	6.4
Centrally Planned Asia	.0	.6	3.1	7.9	8.7	8.6
Middle East	1.5	2.2	3.7	3.9	2.9	2.6
Africa	.5	.9	1.2	1.8	2.1	2.4
Latin America	.5	.0	.0	2.1	3.0	3.0
South and East Asia	.3	.7	2.6	6.4	8.2	9.4
TOTAL	13.9	20.9	29.9	44.1	40.1	37.8

ELECTRICITY SOLIDS CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	14.7	13.4	12.4	11.6	6.1	2.9
OECD Europe-Canada	4.0	4.6	6.4	7.5	4.4	2.3
OECD Pacific	2.0	2.3	3.4	4.0	2.3	1.2
Centrally Planned Eur.	17.3	19.3	22.3	24.2	14.5	7.5
Centrally Planned Asia	3.5	5.6	10.2	16.6	15.7	10.1
Middle East	.0	.3	2.6	4.1	5.3	3.1
Africa	1.5	2.0	2.9	3.9	3.7	2.8
Latin America	.1	.0	.0	4.5	5.3	3.5
South and East Asia	1.6	2.8	6.8	13.4	14.8	11.0
TOTAL	44.7	50.3	67.0	89.8	72.1	44.4

ELECTRICITY HYDRO CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.3	3.9	4.4	4.7	4.7	4.8
OECD Europe-Canada	8.2	9.7	10.8	11.0	11.1	11.1
OECD Pacific	1.2	1.3	1.3	1.4	1.4	1.5
Centrally Planned Eur.	2.5	3.2	3.7	3.7	3.7	3.7
Centrally Planned Asia	1.0	2.6	7.6	10.8	11.5	11.6
Middle East	.1	.2	.5	.6	.7	.7
Africa	.2	.5	1.7	4.2	6.2	7.0
Latin America	3.3	7.2	16.4	20.0	20.6	20.7
South and East Asia	1.4	2.8	6.9	10.5	11.9	12.4
TOTAL	21.2	31.4	53.3	66.9	71.8	73.5

ELECTRICITY NUCLEAR CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.9	4.5	5.5	5.7	9.4	9.4
OECD Europe-Canada	6.7	7.4	7.8	7.4	9.1	7.4
OECD Pacific	1.8	2.5	2.7	2.5	3.6	3.8
Centrally Planned Eur.	2.6	3.7	8.1	12.0	22.5	24.5
Centrally Planned Asia	.0	.1	3.3	8.3	24.2	33.0
Middle East	.0	.0	1.3	4.0	8.1	10.1
Africa	.0	.0	.8	1.9	5.8	9.1
Latin America	.0	.0	.0	2.2	8.2	11.4
South and East Asia	.2	.4	2.3	6.8	22.8	35.9
TOTAL	15.2	18.6	31.8	50.8	113.7	144.6

ELECTRICITY SOLAR CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.6	2.5	5.7	13.0	15.7
OECD Europe-Canada	.0	.3	1.6	3.7	9.4	12.4
OECD Pacific	.0	.2	.8	2.0	4.9	6.4
Centrally Planned Eur.	.0	.7	4.1	12.1	31.0	41.1
Centrally Planned Asia	.0	.2	1.7	8.4	33.3	55.4
Middle East	.0	.0	.8	4.0	11.1	16.9
Africa	.0	.0	.5	2.0	7.9	15.3
Latin America	.0	.0	.0	2.2	11.4	19.1
South and East Asia	.0	.0	1.3	6.8	31.5	60.2
TOTAL	.0	2.0	13.3	46.9	153.5	242.5

TOTAL ELECTRIC UTILITY ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	27.1	30.4	32.5	35.2	37.8	36.2
OECD Europe-Canada	21.3	25.4	31.1	34.6	37.2	35.8
OECD Pacific	6.8	8.3	10.6	12.6	13.9	14.2
Centrally Planned Eur.	33.2	40.5	52.2	68.1	82.5	85.4
Centrally Planned Asia	5.3	10.4	27.8	55.3	96.3	121.7
Middle East	2.8	4.1	10.5	18.3	29.1	34.3
Africa	2.6	4.0	7.7	14.6	26.4	37.4
Latin America	4.3	7.2	16.4	32.0	49.5	58.7
South and East Asia	4.2	7.8	21.5	46.6	92.0	132.2
TOTAL	107.6	138.1	210.3	317.3	464.7	555.9

TABLE A-133

ENERGY CONVERSION EFFICIENCY AT ELECTRIC UTILITY POWERPLANTS
(percent)

REGION	1985	2000	2025	2050	2075	2100
United States	31.7	33.2	34.5	35.8	35.4	34.5
OECD Europe-Canada	32.4	33.5	34.1	35.3	34.9	34.4
OECD Pacific	30.9	31.3	34.0	35.7	36.0	34.5
Centrally Planned Eur.	31.6	32.6	34.7	36.3	35.8	34.9
Centrally Planned Asia	26.4	28.8	33.5	36.2	35.6	34.8
Middle East	25.0	26.8	36.2	35.5	35.7	35.0
Africa	23.1	32.5	35.1	35.6	34.8	34.8
Latin America	30.2	33.3	33.5	34.4	34.7	34.2
South and East Asia	26.2	30.8	33.0	36.3	35.5	34.8

*Includes transmission and distribution losses

TABLE A-134

SYNTHETIC PRODUCTION OF OIL AND GAS

OIL FROM SYNFUELS
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.2	2.7	5.1	8.1
OECD Europe-Canada	.0	.0	.1	1.1	2.7	5.0
OECD Pacific	.0	.0	.0	.7	1.5	2.7
Centrally Planned Eur.	.0	.0	.4	4.7	9.1	14.8
Centrally Planned Asia	.0	.0	.4	4.1	6.9	9.2
Middle East	.0	.0	.0	.0	.0	-.2
Africa	.0	.0	.0	2.5	7.8	16.0
Latin America	.0	.0	.0	3.6	11.2	23.1
South and East Asia	.0	.0	.1	1.8	5.1	10.3
TOTAL	.0	.0	1.2	21.2	49.4	89.4

GAS FROM SYNFUELS
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	1.1	3.3	5.0	5.8
OECD Europe-Canada	.0	.0	.8	2.3	3.6	4.1
OECD Pacific	.0	.0	.4	1.2	1.8	2.1
Centrally Planned Eur.	.0	.0	2.1	6.1	9.4	10.8
Centrally Planned Asia	.0	.0	1.0	2.9	4.4	5.1
Middle East	.0	.0	.0	.0	.1	.2
Africa	.0	.0	2.8	8.0	12.2	14.1
Latin America	.0	.0	4.1	12.1	18.3	21.1
South and East Asia	.0	.0	1.8	5.3	8.1	9.3
TOTAL	.0	.0	14.1	41.2	62.9	72.6

TABLE A-135

ENERGY USED FOR SYNTHETIC FUEL PRODUCTION BY TYPE

COAL USED IN SYNFUEL PRODUCTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.4	2.6	3.1	2.7
OECD Europe-Canada	.0	.0	.2	1.1	1.0	.9
OECD Pacific	.0	.0	.0	.6	.7	.6
Centrally Planned Eur.	.0	.0	.6	4.3	5.3	4.6
Centrally Planned Asia	.0	.0	.7	5.0	6.5	5.7
Middle East	.0	.0	.0	.0	.0	.0
Africa	.0	.0	.1	.9	1.3	1.5
Latin America	.0	.0	.0	.3	.3	.2
South and East Asia	.0	.0	.2	.6	.5	.5
TOTAL	.0	.0	2.2	15.4	18.7	16.7

BIOMASS USED IN SYNFUEL PRODUCTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	1.5	5.7	10.7	16.0
OECD Europe-Canada	.0	.0	1.1	4.0	7.6	11.4
OECD Pacific	.0	.0	.5	2.0	3.8	5.7
Centrally Planned Eur.	.0	.0	2.8	10.6	19.9	29.9
Centrally Planned Asia	.0	.0	1.3	5.0	9.4	14.1
Middle East	.0	.0	.0	.1	.3	.4
Africa	.0	.0	3.7	13.9	26.0	39.1
Latin America	.0	.0	5.5	20.8	39.0	58.7
South and East Asia	.0	.0	2.4	9.1	17.1	25.8
TOTAL	.0	.0	18.8	71.2	133.8	201.1

TOTAL USED IN SYNFUEL PRODUCTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	1.9	8.3	13.8	18.7
OECD Europe-Canada	.0	.0	1.3	5.1	8.6	12.3
OECD Pacific	.0	.0	.5	2.6	4.5	6.3
Centrally Planned Eur.	.0	.0	3.4	14.9	25.2	34.5
Centrally Planned Asia	.0	.0	2.0	10.0	15.9	19.8
Middle East	.0	.0	.0	.1	.3	.4
Africa	.0	.0	3.8	14.8	27.3	40.6
Latin America	.0	.0	5.5	21.1	39.3	58.9
South and East Asia	.0	.0	2.6	9.7	17.6	26.3
TOTAL	.0	.0	21.0	86.6	152.5	217.8

TABLE A-136

CO2 EMISSIONS FROM FOSSIL FUEL
(Petagrams C/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	1.3	1.3	1.1	1.0	.6	.3
OECD Europe-Canada	.8	.8	.7	.7	.4	.2
OECD Pacific	.3	.3	.3	.3	.2	.1
Centrally Planned Eur.	1.4	1.5	1.6	1.8	1.2	.7
Centrally Planned Asia	.5	.7	1.3	2.0	1.7	1.2
Middle East	.1	.2	.4	.5	.5	.4
Africa	.1	.2	.3	.4	.2	.0
Latin America	.2	.3	.4	.7	.3	-.0
South and East Asia	.3	.4	.8	1.3	1.2	1.0
TOTAL	5.1	5.8	7.0	8.5	6.2	3.9

TABLE A-137

CO EMISSIONS FROM FOSSIL FUEL
(Teragrams C/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	51.0	26.4	9.6	7.4	6.0	6.2
OECD Europe-Canada	39.0	28.8	6.7	5.4	4.3	4.5
OECD Pacific	13.2	10.6	2.6	2.2	2.0	2.2
Centrally Planned Eur.	35.0	36.2	26.5	10.9	10.4	12.1
Centrally Planned Asia	4.7	6.0	8.9	7.5	8.4	10.2
Middle East	4.2	4.3	5.9	3.1	3.4	4.4
Africa	8.1	9.6	12.5	5.7	5.8	6.5
Latin America	16.7	17.4	18.3	8.8	9.2	10.8
South and East Asia	10.2	10.3	10.5	7.2	9.2	12.7
TOTAL	182.0	149.5	101.5	58.1	58.6	69.6

TABLE A-138

NOX EMISSIONS FROM FOSSIL FUEL
(Teragrams N/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	6.3	5.4	2.7	2.0	1.5	1.4
OECD Europe-Canada	3.9	3.5	1.8	1.5	1.1	1.3
OECD Pacific	1.5	1.4	.7	.6	.5	.5
Centrally Planned Eur.	6.1	6.5	4.7	3.4	2.8	2.9
Centrally Planned Asia	2.0	3.1	5.2	3.7	3.2	2.9
Middle East	.5	.7	1.3	1.2	1.0	.9
Africa	.8	1.1	1.8	1.7	1.7	1.9
Latin America	1.1	1.4	2.2	2.7	2.6	2.9
South and East Asia	1.1	1.8	2.9	2.8	2.9	3.2
TOTAL	23.2	25.1	23.2	19.6	17.3	17.9

TABLE A-139

PRIMARY ENERGY SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	63.7	51.7	43.0	44.4	43.1	44.6
OECD Europe-Canada	47.6	48.5	43.0	41.2	40.6	40.8
OECD Pacific	8.9	10.5	10.2	13.5	14.4	15.6
Centrally Planned Eur.	81.2	83.3	79.9	91.2	82.8	78.0
Centrally Planned Asia	25.6	35.8	54.3	61.9	63.2	59.8
Middle East	23.7	41.1	58.7	22.2	17.0	19.5
Africa	16.3	21.4	32.4	57.5	63.2	63.0
Latin America	20.5	21.8	35.3	74.3	82.9	85.8
South and East Asia	14.1	16.7	28.8	48.2	58.2	60.1
TOTAL	301.6	330.8	385.6	454.4	465.4	467.2

TABLE A-140

PRIMARY OIL SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	20.8	11.7	5.9	3.2	2.1	1.2
OECD Europe-Canada	11.9	8.9	7.3	5.2	3.7	2.2
OECD Pacific	1.1	.6	.2	.0	.0	.0
Centrally Planned Eur.	26.0	21.0	16.4	9.7	7.7	4.8
Centrally Planned Asia	5.2	6.5	6.0	3.8	3.6	2.3
Middle East	22.4	38.6	52.5	13.6	7.9	11.3
Africa	10.8	15.3	17.3	11.9	11.6	7.6
Latin America	14.1	10.3	9.8	3.9	6.1	4.9
South and East Asia	5.6	4.3	3.4	2.3	1.6	.9
TOTAL	117.9	117.2	118.8	53.6	44.3	35.2

TABLE A-141

PRIMARY GAS SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	16.3	15.1	9.9	2.0	1.7	2.2
OECD Europe-Canada	9.7	11.6	8.6	1.8	1.4	1.9
OECD Pacific	.7	1.5	1.4	.3	.3	.4
Centrally Planned Eur.	24.0	27.9	24.7	21.0	13.7	8.3
Centrally Planned Asia	.5	1.4	2.2	.5	.0	.0
Middle East	1.2	2.3	4.6	3.7	3.6	3.0
Africa	1.3	2.3	2.7	.6	.1	.0
Latin America	2.5	4.5	4.5	.9	.2	.0
South and East Asia	2.4	2.4	2.9	.6	1.1	1.6
TOTAL	58.6	69.0	61.5	31.4	22.1	17.4

TABLE A-142

PRIMARY COAL SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	19.4	15.4	9.3	4.1	2.7	3.5
OECD Europe-Canada	9.4	10.6	7.2	3.4	3.2	3.4
OECD Pacific	3.9	4.5	3.4	1.9	1.8	2.0
Centrally Planned Eur.	26.7	27.2	18.2	8.1	6.9	9.0
Centrally Planned Asia	18.9	25.2	32.5	23.1	20.5	17.5
Middle East	.0	.0	.0	.0	.0	.0
Africa	4.0	3.3	3.5	1.6	2.0	2.2
Latin America	.6	1.0	1.5	.7	.3	.3
South and East Asia	4.4	6.8	9.7	4.3	7.1	4.8
TOTAL	87.3	94.0	85.3	47.2	44.5	42.7

TABLE A-143

PRIMARY BIOMASS ENERGY SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	2.6	15.3	17.1	18.5
OECD Europe-Canada	.0	.0	1.8	11.0	12.2	13.2
OECD Pacific	.0	.0	.9	5.5	6.1	6.7
Centrally Planned Eur.	.0	.0	4.8	28.6	31.8	34.5
Centrally Planned Asia	.0	.0	2.2	13.5	15.0	16.3
Middle East	.0	.0	.0	.4	.5	.5
Africa	.0	.0	6.2	37.5	41.7	45.2
Latin America	.0	.0	9.4	56.2	62.5	67.8
South and East Asia	.0	.0	4.1	24.7	27.4	29.8
TOTAL	.0	.0	32.0	192.7	214.3	232.5

TABLE A-144

PRIMARY HYDROELECTRIC SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.3	3.8	4.3	4.6	4.7	4.8
OECD Europe-Canada	8.2	9.6	10.6	11.0	11.1	11.1
OECD Pacific	1.2	1.3	1.3	1.4	1.4	1.4
Centrally Planned Eur.	2.5	3.1	3.6	3.7	3.7	3.7
Centrally Planned Asia	1.0	2.3	6.4	10.0	11.3	11.6
Middle East	.1	.2	.4	.6	.7	.7
Africa	.2	.4	1.3	3.2	5.3	6.6
Latin America	3.3	6.0	10.1	12.6	13.8	12.8
South and East Asia	1.4	2.6	5.9	9.4	11.4	12.1
TOTAL	21.2	29.3	43.9	56.5	63.4	64.8

TABLE A-145

PRIMARY NUCLEAR SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.8	4.7	5.6	6.7	6.9	7.1
OECD Europe-Canada	8.4	7.3	5.2	5.4	5.7	6.0
OECD Pacific	2.0	2.4	1.8	2.2	2.5	2.8
Centrally Planned Eur.	2.0	3.1	5.8	8.8	8.9	8.8
Centrally Planned Asia	.0	.1	2.4	4.8	6.0	6.0
Middle East	.0	.0	.5	1.7	2.0	2.0
Africa	.0	.0	.6	1.2	1.2	.7
Latin America	.0	.0	.0	.0	.0	.0
South and East Asia	.3	.4	1.3	3.0	4.5	5.4
TOTAL	16.5	18.0	23.2	33.8	37.7	38.8

TABLE A-146

PRIMARY SOLAR SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.1	1.0	5.4	8.5	7.9	7.3
OECD Europe-Canada	.0	.5	2.3	3.4	3.3	3.0
OECD Pacific	.0	.2	1.2	2.2	2.3	2.3
Centrally Planned Eur.	.0	1.0	6.4	11.3	10.1	8.9
Centrally Planned Asia	.0	.3	2.6	6.2	6.8	6.1
Middle East	.0	.0	.7	2.2	2.3	2.0
Africa	.0	.1	.8	1.5	1.3	.7
Latin America	.0	.0	.0	.0	.0	.0
South and East Asia	.0	.2	1.5	3.9	5.1	5.5
TOTAL	.1	3.3	20.9	39.2	39.1	35.8

TABLE A-147

PRIMARY ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	74.9	73.9	71.4	71.9	68.3	67.8
OECD Europe-Canada	67.0	66.5	62.3	62.2	60.7	61.4
OECD Pacific	19.3	18.9	17.8	19.6	20.1	21.4
Centrally Planned Eur.	71.1	80.0	84.5	90.9	82.8	79.8
Centrally Planned Asia	23.8	33.5	53.4	59.8	62.6	61.7
Middle East	5.8	7.8	11.0	16.6	17.4	16.1
Africa	7.6	9.3	15.0	26.6	30.5	30.8
Latin America	15.6	20.3	33.7	51.4	54.8	53.0
South and East Asia	15.1	21.2	37.2	56.1	67.8	74.6
TOTAL	300.2	331.4	386.3	455.1	465.0	466.6

TABLE A-148

SECONDARY ENERGY CONSUMPTION: FUEL VERSUS ELECTRICITY

FUEL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	48.2	44.9	42.2	40.2	37.6	37.6
OECD Europe-Canada	42.4	41.8	38.7	36.3	34.8	35.4
OECD Pacific	11.9	11.4	10.6	10.2	10.4	11.3
Centrally Planned Eur.	44.6	48.8	50.5	49.4	43.0	42.1
Centrally Planned Asia	17.0	23.1	34.4	29.6	29.1	28.6
Middle East	3.9	5.0	7.0	10.0	10.4	9.8
Africa	4.7	5.7	8.5	10.1	11.3	10.9
Latin America	11.3	14.3	21.3	25.3	25.8	23.5
South and East Asia	10.4	14.3	23.5	30.1	35.7	39.3
TOTAL	194.4	209.3	236.7	241.2	238.7	238.5

ELECRICITY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	8.4	9.7	9.9	9.9	9.5	9.2
OECD Europe-Canada	8.0	8.2	7.9	7.9	7.9	7.9
OECD Pacific	2.4	2.4	2.4	2.8	2.9	3.0
Centrally Planned Eur.	8.4	10.3	11.4	12.3	11.4	10.5
Centrally Planned Asia	1.8	3.1	6.1	9.4	10.5	10.2
Middle East	.5	.8	1.4	2.3	2.5	2.2
Africa	.8	1.0	1.6	2.6	3.1	2.9
Latin America	1.3	2.0	3.4	4.2	4.6	4.3
South and East Asia	1.3	2.1	4.1	6.8	8.9	9.8
TOTAL	32.9	39.6	48.2	58.2	61.3	60.0

TOTAL ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	56.6	54.6	52.1	50.1	47.1	46.8
OECD Europe-Canada	50.4	50.0	46.6	44.2	42.7	43.3
OECD Pacific	14.3	13.8	13.0	13.0	13.3	14.3
Centrally Planned Eur.	53.0	59.1	61.9	61.7	55.0	52.6
Centrally Planned Asia	18.8	26.2	40.5	39.0	39.6	38.8
Middle East	4.4	5.8	8.4	12.3	12.9	12.0
Africa	5.5	6.7	10.1	12.7	14.4	13.8
Latin America	12.6	16.3	24.7	29.5	30.4	27.8
South and East Asia	11.7	16.4	27.6	36.9	44.6	49.1
TOTAL	227.3	248.9	284.9	299.4	300.0	298.5

TABLE A-149

SECONDARY OIL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	28.8	26.2	23.3	20.4	19.3	20.2
OECD Europe-Canada	25.8	25.0	22.8	20.5	19.8	20.9
OECD Pacific	8.0	7.4	7.1	6.7	7.0	7.9
Centrally Planned Eur.	14.6	17.4	18.8	18.5	17.8	19.1
Centrally Planned Asia	2.2	2.8	4.6	6.4	8.4	11.2
Middle East	3.4	4.5	5.6	7.5	7.8	7.7
Africa	3.1	3.4	4.8	5.8	6.6	6.7
Latin America	8.6	10.7	13.8	15.6	15.9	15.0
South and East Asia	6.1	7.9	11.5	16.1	19.9	23.5
TOTAL	100.6	105.3	112.3	117.5	122.5	132.2

TABLE A-150

SECONDARY GAS CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	15.6	14.3	15.8	18.2	16.9	16.0
OECD Europe-Canada	10.3	9.8	10.6	12.9	12.3	11.7
OECD Pacific	1.3	1.2	1.2	2.0	2.0	2.0
Centrally Planned Eur.	17.1	16.9	20.8	25.0	20.4	18.5
Centrally Planned Asia	.3	.3	.8	1.3	1.3	1.3
Middle East	.5	.5	1.4	2.5	2.6	2.1
Africa	.4	.5	1.1	1.9	2.2	1.9
Latin America	2.1	2.6	6.0	8.7	9.0	7.8
South and East Asia	1.2	1.6	4.1	7.4	8.9	9.3
TOTAL	48.8	47.7	61.8	79.9	75.6	70.6

TABLE A-151

SECONDARY SOLIDS CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.8	4.4	3.1	1.6	1.4	1.4
OECD Europe-Canada	6.3	7.0	5.3	2.9	2.7	2.8
OECD Pacific	2.6	2.8	2.3	1.5	1.4	1.4
Centrally Planned Eur.	12.9	14.5	10.9	5.9	5.4	4.5
Centrally Planned Asia	14.5	20.0	29.0	21.9	19.4	16.1
Middle East	.0	.0	.0	.0	.0	.0
Africa	1.2	1.8	2.6	2.4	2.5	2.3
Latin America	.6	1.0	1.5	1.0	.9	.7
South and East Asia	3.1	4.8	7.9	6.6	6.9	6.5
TOTAL	45.0	56.3	62.6	43.8	40.6	35.7

TABLE A-152

RESIDENTIAL/COMMERCIAL ENERGY CONSUMPTION: FUEL VERSUS ELECTRICITY

FUEL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	11.5	10.1	10.3	10.1	9.0	8.1
OECD Europe-Canada	12.9	13.2	11.6	10.8	9.6	8.7
OECD Pacific	1.6	1.7	1.5	1.5	1.5	1.5
Centrally Planned Eur.	13.2	12.8	15.6	15.6	13.4	11.7
Centrally Planned Asia	4.3	5.2	6.0	5.6	5.9	6.1
Middle East	.2	.4	.7	1.0	1.2	1.2
Africa	.4	.8	1.6	2.0	2.2	1.9
Latin America	1.6	2.2	3.2	4.2	4.6	4.4
South and East Asia	2.2	3.1	5.0	6.4	7.6	8.0
TOTAL	47.9	49.5	55.5	57.2	55.0	51.6

ELECTRICITY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	5.2	6.0	6.7	6.5	6.1	5.8
OECD Europe-Canada	4.5	4.3	4.6	4.3	4.1	4.0
OECD Pacific	1.1	1.1	1.3	1.4	1.4	1.5
Centrally Planned Eur.	1.3	2.0	3.8	3.9	3.6	3.3
Centrally Planned Asia	.2	.5	1.2	1.8	2.3	2.6
Middle East	.1	.2	.4	.7	.9	.9
Africa	.3	.4	.7	1.1	1.3	1.2
Latin America	.5	.8	1.3	1.7	2.0	2.1
South and East Asia	.5	.8	1.6	2.6	3.6	4.1
TOTAL	13.7	16.1	21.6	24.0	25.3	25.5

TOTAL ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	16.7	16.1	17.0	16.6	15.1	13.9
OECD Europe-Canada	17.4	17.5	16.2	15.1	13.7	12.7
OECD Pacific	2.7	2.8	2.8	2.9	2.9	3.0
Centrally Planned Eur.	14.5	14.8	19.4	19.5	17.0	15.0
Centrally Planned Asia	4.5	5.7	7.2	7.4	8.2	8.7
Middle East	.3	.6	1.1	1.7	2.1	2.1
Africa	.7	1.2	2.3	3.1	3.5	3.1
Latin America	2.1	3.0	4.5	5.9	6.6	6.5
South and East Asia	2.7	3.9	6.6	9.0	11.2	12.1
TOTAL	61.6	65.6	77.1	81.2	80.3	77.1

TABLE A-153

INDUSTRIAL ENERGY CONSUMPTION: FUEL VERSUS ELECTRICITY

FUEL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	15.6	16.5	13.8	14.0	13.1	12.7
OECD Europe-Canada	13.9	14.5	11.6	11.4	11.2	11.0
OECD Pacific	5.4	5.5	4.6	4.2	4.0	4.0
Centrally Planned Eur.	23.7	26.0	21.4	20.1	16.2	14.4
Centrally Planned Asia	11.5	16.4	25.3	19.6	16.8	13.0
Middle East	3.0	3.8	5.1	7.6	7.1	5.4
Africa	2.1	2.6	3.3	4.0	4.4	3.9
Latin America	5.5	7.6	11.4	13.6	13.1	10.5
South and East Asia	5.4	8.1	13.4	16.7	18.4	17.6
TOTAL	86.1	101.0	109.9	111.2	104.3	92.5

ELECTRICITY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.2	3.7	3.2	3.4	3.4	3.4
OECD Europe-Canada	3.5	3.9	3.3	3.6	3.8	3.9
OECD Pacific	1.3	1.3	1.1	1.4	1.5	1.5
Centrally Planned Eur.	7.1	8.3	7.6	8.4	7.8	7.2
Centrally Planned Asia	1.6	2.6	4.9	7.5	8.0	7.3
Middle East	.4	.6	1.0	1.6	1.6	1.3
Africa	.5	.6	.9	1.5	1.8	1.7
Latin America	.8	1.2	2.1	2.5	2.6	2.2
South and East Asia	.8	1.3	2.5	4.2	5.3	5.6
TOTAL	19.2	23.5	26.6	34.1	35.8	34.1

TOTAL ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	18.8	20.2	17.0	17.4	16.5	16.1
OECD Europe-Canada	17.4	18.4	14.9	15.0	15.0	14.9
OECD Pacific	6.7	6.8	5.7	5.6	5.5	5.5
Centrally Planned Eur.	30.8	34.3	29.0	28.5	24.0	21.6
Centrally Planned Asia	13.1	19.0	30.2	27.1	24.8	20.3
Middle East	3.4	4.4	6.1	9.2	8.7	6.7
Africa	2.6	3.2	4.2	5.5	6.2	5.6
Latin America	6.3	8.8	13.5	16.1	15.7	12.7
South and East Asia	6.2	9.4	15.9	20.9	23.7	23.2
TOTAL	105.3	124.5	136.5	145.3	140.1	126.6

TABLE A-154

TRANSPORTATION ENERGY CONSUMPTION: FUEL VERSUS ELECTRICITY

FUEL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	21.1	18.3	18.1	16.1	15.5	16.8
OECD Europe-Canada	15.6	14.1	15.5	14.1	14.0	15.7
OECD Pacific	4.9	4.2	4.5	4.5	4.9	5.8
Centrally Planned Eur.	7.7	10.0	13.5	13.7	14.0	16.0
Centrally Planned Asia	1.2	1.5	3.1	4.4	6.4	9.5
Middle East	.7	.8	1.2	1.4	2.1	3.2
Africa	2.2	2.3	3.6	4.1	4.7	5.1
Latin America	4.2	4.5	6.7	7.5	8.1	8.6
South and East Asia	2.8	3.1	5.1	7.0	9.7	13.7
TOTAL	60.4	58.8	71.3	72.8	79.4	94.4

ELECTRICITY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.0	.0	.0	.0
OECD Europe-Canada	.0	.0	.0	.0	.0	.0
OECD Pacific	.0	.0	.0	.0	.0	.0
Centrally Planned Eur.	.0	.0	.0	.0	.0	.0
Centrally Planned Asia	.0	.0	.0	.1	.2	.3
Middle East	.0	.0	.0	.0	.0	.0
Africa	.0	.0	.0	.0	.0	.0
Latin America	.0	.0	.0	.0	.0	.0
South and East Asia	.0	.0	.0	.0	.0	.1
TOTAL	.0	.0	.0	.1	.2	.4

TOTAL ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	21.1	18.3	18.1	16.1	15.5	16.8
OECD Europe-Canada	15.6	14.1	15.5	14.1	14.0	15.7
OECD Pacific	4.9	4.2	4.5	4.5	4.9	5.8
Centrally Planned Eur.	7.7	10.0	13.5	13.7	14.0	16.0
Centrally Planned Asia	1.2	1.5	3.1	4.5	6.6	9.8
Middle East	.7	.8	1.2	1.4	2.1	3.2
Africa	2.2	2.3	3.6	4.1	4.7	5.1
Latin America	4.2	4.5	6.7	7.5	8.1	8.6
South and East Asia	2.8	3.1	5.1	7.0	9.7	13.8
TOTAL	60.4	58.8	71.3	72.9	79.6	94.8

TABLE A-155

ELECTRIC UTILITY ENERGY CONSUMPTION

ELECTRICITY OIL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	1.3	2.1	1.6	1.1	1.0	.9
OECD Europe-Canada	1.8	1.5	.7	.5	.4	.4
OECD Pacific	1.5	1.0	.4	.3	.3	.3
Centrally Planned Eur.	3.8	3.9	2.2	1.5	1.3	1.1
Centrally Planned Asia	1.1	1.4	.9	.8	.9	.8
Middle East	.8	.8	.5	.3	.3	.2
Africa	.4	.5	.3	.2	.2	.0
Latin America	.4	.0	.0	.0	.0	.0
South and East Asia	.8	.9	.6	.5	.6	.7
TOTAL	11.9	12.1	7.2	5.2	5.0	4.4

ELECTRICITY GAS CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.8	6.4	6.1	4.9	4.2	3.9
OECD Europe-Canada	1.2	2.2	2.3	2.0	1.8	1.6
OECD Pacific	.4	1.0	1.2	1.3	1.2	1.2
Centrally Planned Eur.	4.6	7.3	7.4	6.5	5.5	4.7
Centrally Planned Asia	.1	1.1	2.7	3.6	3.7	3.2
Middle East	1.0	1.4	1.5	1.3	1.2	1.1
Africa	.5	.9	1.0	.9	.7	.4
Latin America	.5	.0	.0	.0	.0	.0
South and East Asia	.3	.8	1.7	2.3	2.8	2.9
TOTAL	12.4	21.1	23.9	22.8	21.1	19.0

ELECTRICITY SOLIDS CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	14.3	11.0	5.7	2.2	1.7	1.6
OECD Europe-Canada	5.0	3.6	1.9	.9	.7	.7
OECD Pacific	2.3	1.6	1.0	.6	.5	.5
Centrally Planned Eur.	13.5	12.7	7.3	2.9	2.1	2.0
Centrally Planned Asia	4.6	5.2	3.5	1.6	1.4	1.4
Middle East	.0	.2	.5	.4	.3	.3
Africa	1.6	1.6	1.0	.4	.3	.2
Latin America	.1	.0	.0	.0	.0	.0
South and East Asia	1.8	2.1	1.8	1.0	1.0	1.2
TOTAL	43.2	38.0	22.7	10.0	8.0	7.9

ELECTRICITY HYDRO CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.3	3.8	4.3	4.6	4.7	4.8
OECD Europe-Canada	8.2	9.6	10.6	11.0	11.1	11.1
OECD Pacific	1.2	1.3	1.3	1.4	1.4	1.4
Centrally Planned Eur.	2.5	3.1	3.6	3.7	3.7	3.7
Centrally Planned Asia	1.0	2.3	6.4	10.0	11.3	11.6
Middle East	.1	.2	.4	.6	.7	.7
Africa	.2	.4	1.3	3.2	5.3	6.6
Latin America	3.3	6.0	10.1	12.6	13.8	12.8
South and East Asia	1.4	2.6	5.9	9.4	11.4	12.1
TOTAL	21.2	29.3	43.9	56.5	63.4	64.8

ENERGY REPORT: **ACCELERATED POLICIES - LOWER GROWTH**

ELECTRICITY NUCLEAR CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.8	4.7	5.6	6.7	6.9	7.1
OECD Europe-Canada	8.4	7.3	5.2	5.4	5.7	6.0
OECD Pacific	2.0	2.4	1.8	2.2	2.5	2.8
Centrally Planned Eur.	2.0	3.1	5.8	8.8	8.9	8.8
Centrally Planned Asia	.0	.1	2.4	4.8	6.0	6.0
Middle East	.0	.0	.5	1.7	2.0	2.0
Africa	.0	.0	.6	1.2	1.2	.7
Latin America	.0	.0	.0	.0	.0	.0
South and East Asia	.3	.4	1.3	3.0	4.5	5.4
TOTAL	16.5	18.0	23.2	33.8	37.7	38.8

ELECTRICITY SOLAR CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.1	1.0	5.4	8.5	7.9	7.3
OECD Europe-Canada	.0	.5	2.3	3.4	3.3	3.0
OECD Pacific	.0	.2	1.2	2.2	2.3	2.3
Centrally Planned Eur.	.0	1.0	6.4	11.3	10.1	8.9
Centrally Planned Asia	.0	.3	2.6	6.2	6.8	6.1
Middle East	.0	.0	.7	2.2	2.3	2.0
Africa	.0	.1	.8	1.5	1.3	.7
Latin America	.0	.0	.0	.0	.0	.0
South and East Asia	.0	.2	1.5	3.9	5.1	5.5
TOTAL	.1	3.3	20.9	39.2	39.1	35.8

TOTAL ELECTRIC UTILITY ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	26.6	29.0	28.7	28.0	26.4	25.6
OECD Europe-Canada	24.6	24.7	23.0	23.2	23.0	22.8
OECD Pacific	7.4	7.5	6.9	8.0	8.2	8.5
Centrally Planned Eur.	26.4	31.1	32.7	34.7	31.6	29.2
Centrally Planned Asia	6.8	10.4	18.5	27.0	30.1	29.1
Middle East	1.9	2.6	4.1	6.5	6.8	6.3
Africa	2.7	3.5	5.0	7.4	9.0	8.6
Latin America	4.3	6.0	10.1	12.6	13.8	12.8
South and East Asia	4.6	7.0	12.8	20.1	25.4	27.8
TOTAL	105.3	121.8	141.8	167.5	174.3	170.7

TABLE A-156

ENERGY CONVERSION EFFICIENCY AT ELECTRIC UTILITY POWERPLANTS
(per cent)

REGION	1985	2000	2025	2050	2075	2100
United States	31.2	33.4	34.8	35.0	35.6	35.9
OECD Europe-Canada	32.5	33.2	33.5	34.1	34.8	34.6
OECD Pacific	32.4	32.0	33.3	33.8	35.4	35.3
Centrally Planned Eur.	31.4	32.8	34.6	35.4	36.4	36.0
Centrally Planned Asia	26.5	29.8	33.0	34.8	35.5	35.1
Middle East	26.3	23.1	36.6	33.8	35.3	36.5
Africa	22.2	25.7	32.0	33.8	33.3	32.6
Latin America	30.2	33.3	33.7	33.3	33.3	33.6
South and East Asia	26.1	31.4	32.8	33.8	35.0	34.9

*Includes transmission and distribution losses

TABLE A-157

SYNTHETIC PRODUCTION OF OIL AND GAS

OIL FROM SYNFUELS
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.0	5.5	6.6	8.1
OECD Europe-Canada	.0	.0	.0	3.9	4.7	5.8
OECD Pacific	.0	.0	.0	2.0	2.4	2.9
Centrally Planned Eur.	.0	.0	.0	10.2	12.4	15.1
Centrally Planned Asia	.0	.0	.0	4.8	5.9	7.1
Middle East	.0	.0	.0	.2	.2	.2
Africa	.0	.0	.0	13.4	16.2	19.7
Latin America	.0	.0	.0	20.1	24.3	29.6
South and East Asia	.0	.0	.0	8.8	10.7	13.0
TOTAL	.0	.0	.0	68.9	83.4	101.5

GAS FROM SYNFUELS
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	1.9	5.7	5.9	5.7
OECD Europe-Canada	.0	.0	1.4	4.0	4.2	4.1
OECD Pacific	.0	.0	.7	2.0	2.1	2.1
Centrally Planned Eur.	.0	.0	3.6	10.6	11.1	10.7
Centrally Planned Asia	.0	.0	1.7	5.0	5.2	5.1
Middle East	.0	.0	.0	.2	.2	.2
Africa	.0	.0	4.7	13.8	14.5	14.0
Latin America	.0	.0	7.0	20.7	21.7	21.1
South and East Asia	.0	.0	3.1	9.1	9.5	9.2
TOTAL	.0	.0	24.1	71.1	74.4	72.2

TABLE A-158

ENERGY USED FOR SYNTHETIC FUEL PRODUCTION BY TYPE

COAL USED IN SYNFUEL PRODUCTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.0	.0	.0	.0
OECD Europe-Canada	.0	.0	.0	.0	.0	.0
OECD Pacific	.0	.0	.0	.0	.0	.0
Centrally Planned Eur.	.0	.0	.0	.0	.0	.0
Centrally Planned Asia	.0	.0	.0	.0	.0	.0
Middle East	.0	.0	.0	.0	.0	.0
Africa	.0	.0	.0	.0	.0	.0
Latin America	.0	.0	.0	.0	.0	.0
South and East Asia	.0	.0	.0	.0	.0	.0
TOTAL	.0	.0	.0	.0	.0	.0

BIOMASS USED IN SYNFUEL PRODUCTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	2.5	14.8	16.7	18.4
OECD Europe-Canada	.0	.0	1.8	10.6	11.9	13.1
OECD Pacific	.0	.0	.9	5.3	6.0	6.6
Centrally Planned Eur.	.0	.0	4.8	27.6	31.2	34.3
Centrally Planned Asia	.0	.0	2.2	13.0	14.7	16.2
Middle East	.0	.0	.0	.4	.5	.5
Africa	.0	.0	6.2	36.2	40.8	44.9
Latin America	.0	.0	9.3	54.3	61.2	67.4
South and East Asia	.0	.0	4.1	23.8	26.9	29.6
TOTAL	.0	.0	31.8	186.0	209.9	231.0

TOTAL USED IN SYNFUEL PRODUC
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	2.5	14.8	16.7	18.4
OECD Europe-Canada	.0	.0	1.8	10.6	11.9	13.1
OECD Pacific	.0	.0	.9	5.3	6.0	6.6
Centrally Planned Eur.	.0	.0	4.8	27.6	31.2	34.3
Centrally Planned Asia	.0	.0	2.2	13.0	14.7	16.2
Middle East	.0	.0	.0	.4	.5	.5
Africa	.0	.0	6.2	36.2	40.8	44.9
Latin America	.0	.0	9.3	54.3	61.2	67.4
South and East Asia	.0	.0	4.1	23.8	26.9	29.6
TOTAL	.0	.0	31.8	186.0	209.9	231.0

TABLE A-159

CO2 EMISSIONS FROM FOSSIL FUEL
(1000 Teragrams/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	1.3	1.2	1.0	.6	.5	.5
OECD Europe-Canada	.9	.9	.8	.6	.5	.5
OECD Pacific	.3	.3	.3	.2	.1	.2
Centrally Planned Eur.	1.3	1.4	1.2	.7	.5	.4
Centrally Planned Asia	.6	.7	1.0	.6	.6	.5
Middle East	.1	.1	.2	.2	.2	.2
Africa	.1	.2	.1	-.3	-.3	-.4
Latin America	.2	.2	.3	-.3	-.4	-.5
South and East Asia	.3	.4	.5	.3	.4	.4
TOTAL	5.1	5.5	5.2	2.5	2.1	1.8

TABLE A-160

CO EMISSIONS FROM FOSSIL FUEL
(Teragrams/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	51.0	24.3	14.1	11.5	11.1	12.0
OECD Europe-Canada	44.7	32.4	12.3	10.2	10.2	11.3
OECD Pacific	14.1	9.5	3.6	3.3	3.6	4.2
Centrally Planned Eur.	31.1	29.8	26.9	10.6	10.5	11.9
Centrally Planned Asia	6.0	6.2	8.3	5.1	6.4	8.4
Middle East	2.9	2.3	2.4	1.2	1.6	2.4
Africa	8.5	6.8	7.2	3.5	3.9	4.1
Latin America	16.3	12.9	13.3	6.0	6.5	6.7
South and East Asia	11.2	9.4	10.6	5.9	8.0	10.7
TOTAL	185.8	133.6	98.7	57.4	61.7	71.7

TABLE A-161

N2O EMISSIONS FROM FOSSIL FUEL
(Teragrams/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.3	.3	.2	.2	.2	.2
OECD Europe-Canada	.1	.2	.2	.1	.1	.2
OECD Pacific	.0	.0	.0	.0	.0	.0
Centrally Planned Eur.	.3	.3	.2	.2	.2	.2
Centrally Planned Asia	.1	.1	.2	.0	.0	.1
Middle East	.0	.0	.0	.0	.0	.0
Africa	.0	.0	.0	.0	.0	.0
Latin America	.0	.0	.0	.0	.0	.0
South and East Asia	.0	.0	.1	.1	.1	.2
TOTAL	1.0	1.2	1.1	.9	.9	1.0

TABLE A-162

PRIMARY ENERGY SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	63.7	51.8	48.5	57.9	66.0	70.2
OECD Europe-Canada	47.6	47.4	46.0	50.7	55.9	57.0
OECD Pacific	8.9	11.0	12.6	16.4	18.4	19.7
Centrally Planned Eur.	81.2	85.2	93.2	113.6	125.2	131.7
Centrally Planned Asia	25.6	41.1	86.5	106.5	113.0	112.7
Middle East	23.7	48.2	63.6	46.4	52.0	56.4
Africa	16.3	22.6	55.3	80.5	89.3	92.4
Latin America	20.5	23.6	71.6	107.2	118.9	127.6
South and East Asia	14.1	19.5	48.8	87.3	112.5	134.7
TOTAL	301.6	350.4	526.1	666.5	751.2	802.4

TABLE A-163

PRIMARY OIL SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	20.8	11.6	5.8	3.6	2.0	1.1
OECD Europe-Canada	11.9	8.7	7.1	5.8	3.6	2.0
OECD Pacific	1.1	.6	.2	.0	.0	.0
Centrally Planned Eur.	26.0	20.9	16.1	9.4	7.8	4.9
Centrally Planned Asia	5.2	6.5	6.4	5.1	3.2	1.8
Middle East	22.4	45.2	52.3	26.1	24.3	16.7
Africa	10.8	15.0	16.4	13.4	11.6	7.3
Latin America	14.1	10.2	9.4	5.4	6.4	4.4
South and East Asia	5.6	4.3	3.3	2.6	1.6	.9
TOTAL	117.9	123.0	117.0	71.4	60.5	39.1

TABLE A-164

PRIMARY GAS SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	16.3	15.2	7.7	2.8	5.4	5.4
OECD Europe-Canada	9.7	11.6	6.4	2.5	5.1	5.6
OECD Pacific	.7	1.6	1.1	.4	.2	.3
Centrally Planned Eur.	24.0	28.2	24.9	21.7	16.0	9.2
Centrally Planned Asia	.5	1.9	4.2	3.5	2.4	1.5
Middle East	1.2	2.8	7.9	8.2	10.3	18.3
Africa	1.3	2.6	1.9	.4	1.1	2.7
Latin America	2.5	4.6	3.2	.7	2.0	5.0
South and East Asia	2.4	3.1	2.6	1.3	1.9	1.6
TOTAL	58.6	71.6	59.9	41.5	44.4	49.6

TABLE A-165

PRIMARY COAL SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	19.4	15.2	9.9	8.2	12.0	13.8
OECD Europe-Canada	9.4	10.0	5.9	3.6	5.1	4.5
OECD Pacific	3.9	4.7	3.1	1.9	2.7	2.7
Centrally Planned Eur.	26.7	28.2	15.8	8.6	16.1	23.6
Centrally Planned Asia	18.9	29.4	47.9	35.3	34.4	33.0
Middle East	.0	.0	.0	.0	.0	.0
Africa	4.0	4.2	5.9	3.8	6.2	7.2
Latin America	.6	1.1	1.8	.8	1.8	3.5
South and East Asia	4.4	8.4	10.8	6.9	5.1	2.7
TOTAL	87.3	101.2	101.1	69.1	83.4	91.0

ACCELERATED POLICIES - HIGHER GROWTH

TABLE A-166

PRIMARY BIOMASS ENERGY SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	10.8	19.5	19.5	19.5
OECD Europe-Canada	.0	.0	7.7	13.9	13.9	13.9
OECD Pacific	.0	.0	3.9	7.0	7.0	7.0
Centrally Planned Eur.	.0	.0	20.1	36.5	36.5	36.5
Centrally Planned Asia	.0	.0	9.5	17.2	17.2	17.2
Middle East	.0	.0	.3	.5	.5	.5
Africa	.0	.0	26.3	47.7	47.7	47.7
Latin America	.0	.0	39.5	71.6	71.6	71.6
South and East Asia	.0	.0	17.3	31.4	31.4	31.4
TOTAL	.0	.0	135.4	245.3	245.3	245.3

TABLE A-167

PRIMARY HYDRO CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.3	3.9	4.4	4.7	4.7	4.8
OECD Europe-Canada	8.2	9.7	10.8	11.0	11.1	11.1
OECD Pacific	1.2	1.3	1.3	1.4	1.4	1.5
Centrally Planned Eur.	2.5	3.2	3.7	3.7	3.7	3.7
Centrally Planned Asia	1.0	2.6	7.6	10.8	11.5	11.6
Middle East	.1	.2	.5	.6	.7	.7
Africa	.2	.5	1.7	4.2	6.2	7.0
Latin America	3.3	7.7	16.5	20.0	20.6	20.7
South and East Asia	1.4	2.8	6.9	10.5	11.9	12.4
TOTAL	21.2	31.9	53.4	66.9	71.8	73.5

TABLE A-168

PRIMARY NUCLEAR SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.8	4.7	5.0	8.4	10.5	12.7
OECD Europe-Canada	8.4	6.8	5.6	8.5	10.9	13.2
OECD Pacific	2.0	2.5	1.8	2.8	3.7	4.5
Centrally Planned Eur.	2.0	3.4	6.0	14.8	21.1	26.7
Centrally Planned Asia	.0	.2	5.2	15.2	20.7	23.6
Middle East	.0	.0	1.1	4.8	7.6	10.0
Africa	.0	.1	1.3	4.8	7.7	10.2
Latin America	.0	.0	.5	3.8	7.7	11.1
South and East Asia	.3	.6	3.6	15.2	28.3	42.5
TOTAL	16.5	18.3	30.1	78.3	118.2	154.5

TABLE A-169

PRIMARY SOLAR SUPPLY
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.1	1.2	4.9	10.7	11.9	12.9
OECD Europe-Canada	.0	.6	2.5	5.4	6.2	6.7
OECD Pacific	.0	.3	1.2	2.9	3.4	3.7
Centrally Planned Eur.	.0	1.3	6.6	18.9	24.0	27.1
Centrally Planned Asia	.0	.5	5.7	19.4	23.6	24.0
Middle East	.0	.0	1.5	6.2	8.6	10.2
Africa	.0	.2	1.8	6.2	8.8	10.3
Latin America	.0	.0	.7	4.9	8.8	11.3
South and East Asia	.0	.3	4.3	19.4	32.3	43.2
TOTAL	.1	4.4	29.2	94.0	127.8	149.4

TABLE A-170

PRIMARY ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	74.9	71.7	71.5	68.7	66.7	68.0
OECD Europe-Canada	67.0	63.8	62.7	60.4	59.4	60.9
OECD Pacific	19.3	20.0	19.5	20.1	21.1	21.8
Centrally Planned Eur.	71.1	84.3	92.4	111.2	123.1	131.5
Centrally Planned Asia	23.8	39.7	89.6	108.9	117.4	117.1
Middle East	5.8	8.9	24.0	35.0	40.6	42.8
Africa	7.6	12.0	33.5	50.7	60.1	64.7
Latin America	15.6	24.6	65.0	91.6	101.0	102.7
South and East Asia	15.1	26.0	68.4	119.1	161.4	194.8
TOTAL	300.2	351.0	526.6	665.7	750.8	804.3

TABLE A-171

SECONDARY ELECTRICITY CONSUMPTION: FUEL VERSUS ELECTRICITY

FUEL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	48.2	42.3	39.1	31.4	27.1	25.5
OECD Europe-Canada	42.4	39.9	35.1	27.4	23.8	22.7
OECD Pacific	11.9	12.1	10.9	9.1	8.6	8.3
Centrally Planned Eur.	44.6	50.0	49.0	49.6	49.9	49.4
Centrally Planned Asia	17.0	24.3	50.2	42.8	42.1	40.0
Middle East	3.9	5.7	14.4	18.4	18.5	16.7
Africa	4.7	7.2	16.1	18.7	20.1	19.6
Latin America	11.3	16.9	35.4	41.6	40.5	35.6
South and East Asia	10.4	16.4	35.5	50.1	60.2	64.7
TOTAL	194.4	216.8	285.7	289.1	290.8	282.5

ELECTRICITY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	8.4	9.8	10.4	11.5	12.3	13.2
OECD Europe-Canada	8.0	8.0	8.8	10.1	11.1	12.0
OECD Pacific	2.4	2.6	2.6	3.3	3.8	4.1
Centrally Planned Eur.	8.4	11.4	13.5	18.7	22.9	25.8
Centrally Planned Asia	1.8	4.0	12.6	21.6	25.2	25.6
Middle East	.5	1.0	3.4	5.8	7.8	9.1
Africa	.8	1.4	3.7	7.1	9.9	11.6
Latin America	1.3	2.6	6.7	11.1	14.7	17.1
South and East Asia	1.3	2.9	9.8	21.5	33.2	43.2
TOTAL	32.9	43.7	71.5	110.7	140.9	161.7

TOTAL ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	56.6	52.1	49.5	42.9	39.4	38.7
OECD Europe-Canada	50.4	47.9	43.9	37.5	34.9	34.7
OECD Pacific	14.3	14.7	13.5	12.4	12.4	12.4
Centrally Planned Eur.	53.0	61.4	62.5	68.3	72.8	75.2
Centrally Planned Asia	18.8	30.3	62.8	64.4	67.3	65.6
Middle East	4.4	6.7	17.8	24.2	26.3	25.8
Africa	5.5	8.6	19.8	25.8	30.0	31.2
Latin America	12.6	19.5	42.1	52.7	55.2	52.7
South and East Asia	11.7	19.3	45.3	71.6	93.4	107.9
TOTAL	227.3	260.5	357.2	399.8	431.7	444.2

TABLE A-172

SECONDARY OIL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	28.8	24.7	19.2	13.5	11.3	11.0
OECD Europe-Canada	25.8	23.8	19.2	13.8	11.5	11.2
OECD Pacific	8.0	7.9	6.8	5.6	5.0	4.8
Centrally Planned Eur.	14.6	17.7	16.9	15.7	15.8	17.7
Centrally Planned Asia	2.2	3.3	7.5	8.9	9.7	10.7
Middle East	3.4	5.1	10.8	13.2	13.3	12.1
Africa	3.1	4.4	9.3	10.1	10.3	10.1
Latin America	8.6	12.6	21.2	23.0	22.3	20.3
South and East Asia	6.1	9.2	17.0	24.7	29.0	31.3
TOTAL	100.6	108.7	127.9	128.5	128.2	129.2

TABLE A-173

SECONDARY GAS CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	15.6	13.3	17.8	16.7	14.6	12.9
OECD Europe-Canada	10.3	9.5	12.1	10.9	9.2	8.6
OECD Pacific	1.3	1.3	2.0	2.1	2.0	1.7
Centrally Planned Eur.	17.1	18.0	24.8	28.8	28.6	25.9
Centrally Planned Asia	.3	.4	1.9	2.7	2.7	2.2
Middle East	.5	.6	3.6	5.2	5.2	4.6
Africa	.4	.7	2.9	4.9	5.2	4.7
Latin America	2.1	3.2	12.6	17.4	16.8	13.9
South and East Asia	1.2	1.9	9.1	15.8	19.6	20.9
TOTAL	48.8	48.9	86.8	104.5	103.9	95.4

TABLE A-174

SECONDARY SOLIDS CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.8	4.3	2.1	1.2	1.2	1.6
OECD Europe-Canada	6.3	6.6	3.8	2.7	3.1	2.9
OECD Pacific	2.6	2.9	2.1	1.4	1.6	1.8
Centrally Planned Eur.	12.9	14.3	7.3	5.1	5.5	5.8
Centrally Planned Asia	14.5	22.6	40.8	31.2	29.7	27.1
Middle East	.0	.0	.0	.0	.0	.0
Africa	1.2	2.1	3.9	3.7	4.6	4.8
Latin America	.6	1.1	1.6	1.2	1.4	1.4
South and East Asia	3.1	5.3	9.4	9.6	11.6	12.5
TOTAL	45.0	59.2	71.0	56.1	58.7	57.9

TABLE A-175

RESIDENTIAL/COMMERCIAL ENERGY CONSUMPTION: FUEL VERSUS ELECTRICITY

FUEL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	11.5	7.8	8.1	7.2	6.3	5.4
OECD Europe-Canada	12.9	12.3	9.4	7.8	6.8	5.9
OECD Pacific	1.6	1.7	1.2	1.1	1.1	.9
Centrally Planned Eur.	13.2	12.9	15.6	16.9	17.0	15.4
Centrally Planned Asia	4.3	5.6	7.6	8.1	9.9	10.7
Middle East	.2	.4	1.2	1.9	2.2	2.3
Africa	.4	.9	2.0	2.9	3.6	3.6
Latin America	1.6	2.3	4.0	5.9	7.1	7.0
South and East Asia	2.2	3.2	5.5	8.5	11.1	12.1
TOTAL	47.9	47.1	54.6	60.3	65.1	63.3

ELECTRICITY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	5.2	5.9	6.5	6.9	7.3	7.6
OECD Europe-Canada	4.5	4.0	5.2	5.4	5.8	6.1
OECD Pacific	1.1	1.1	1.3	1.5	1.7	1.8
Centrally Planned Eur.	1.3	2.3	5.3	7.0	8.5	9.5
Centrally Planned Asia	.2	.5	1.4	2.7	4.0	4.9
Middle East	.1	.2	.8	1.6	2.4	3.2
Africa	.3	.5	1.3	2.4	3.6	4.5
Latin America	.5	.9	1.8	3.4	5.2	6.6
South and East Asia	.5	1.0	3.1	7.0	11.6	15.9
TOTAL	13.7	16.4	26.7	37.9	50.1	60.1

TOTAL ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	16.7	13.7	14.6	14.1	13.6	13.0
OECD Europe-Canada	17.4	16.3	14.6	13.2	12.6	12.0
OECD Pacific	2.7	2.8	2.5	2.6	2.8	2.7
Centrally Planned Eur.	14.5	15.2	20.9	23.9	25.5	24.9
Centrally Planned Asia	4.5	6.1	9.0	10.8	13.9	15.6
Middle East	.3	.6	2.0	3.5	4.6	5.5
Africa	.7	1.4	3.3	5.3	7.2	8.1
Latin America	2.1	3.2	5.8	9.3	12.3	13.6
South and East Asia	2.7	4.2	8.6	15.5	22.7	28.0
TOTAL	61.6	63.5	81.3	98.2	115.2	123.4

TABLE A-176

INDUSTRIAL ENERGY CONSUMPTION: FUEL VERSUS ELECTRICITY

FUEL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	15.6	17.4	16.4	14.4	12.6	11.5
OECD Europe-Canada	13.9	14.7	12.9	11.0	9.8	9.2
OECD Pacific	5.4	6.1	5.4	4.8	4.6	4.2
Centrally Planned Eur.	23.7	27.4	21.6	21.9	21.6	19.9
Centrally Planned Asia	11.5	19.0	38.4	29.8	26.1	21.1
Middle East	3.0	4.5	11.1	14.1	13.2	10.1
Africa	2.1	3.4	7.5	9.6	10.3	9.1
Latin America	5.5	9.6	21.9	26.5	24.0	17.7
South and East Asia	5.4	10.0	24.5	34.4	39.3	38.1
TOTAL	86.1	112.1	159.7	166.5	161.5	140.9

ELECTRICITY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.2	3.9	3.9	4.6	5.0	5.6
OECD Europe-Canada	3.5	4.0	3.6	4.7	5.3	5.9
OECD Pacific	1.3	1.5	1.3	1.8	2.1	2.3
Centrally Planned Eur.	7.1	9.1	8.2	11.7	14.4	16.3
Centrally Planned Asia	1.6	3.5	11.0	18.7	20.9	20.2
Middle East	.4	.8	2.6	4.2	5.4	5.9
Africa	.5	.9	2.4	4.7	6.3	7.1
Latin America	.8	1.7	4.9	7.7	9.5	10.5
South and East Asia	.8	1.9	6.6	14.3	21.3	26.8
TOTAL	19.2	27.3	44.5	72.4	90.2	100.6

TOTAL ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	18.8	21.3	20.3	19.0	17.6	17.1
OECD Europe-Canada	17.4	18.7	16.5	15.7	15.1	15.1
OECD Pacific	6.7	7.6	6.7	6.6	6.7	6.5
Centrally Planned Eur.	30.8	36.5	29.8	33.6	36.0	36.2
Centrally Planned Asia	13.1	22.5	49.4	48.5	47.0	41.3
Middle East	3.4	5.3	13.7	18.3	18.6	16.0
Africa	2.6	4.3	9.9	14.3	16.6	16.2
Latin America	6.3	11.3	26.8	34.2	33.5	28.2
South and East Asia	6.2	11.9	31.1	48.7	60.6	64.9
TOTAL	105.3	139.4	204.2	238.9	251.7	241.5

TABLE A-177

TRANSPORTATION ENERGY CONSUMPTION FUEL VERSUS ELECTRICITY

FUEL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	21.1	17.1	14.6	9.8	8.2	8.6
OECD Europe-Canada	15.6	12.9	12.8	8.6	7.2	7.6
OECD Pacific	4.9	4.3	4.3	3.2	2.9	3.2
Centrally Planned Eur.	7.7	9.7	11.8	10.8	11.3	14.1
Centrally Planned Asia	1.2	1.7	4.2	4.9	6.1	8.2
Middle East	.7	.8	2.1	2.4	3.1	4.3
Africa	2.2	2.9	6.6	6.2	6.2	6.9
Latin America	4.2	5.0	9.5	9.2	9.4	10.9
South and East Asia	2.8	3.2	5.5	7.2	9.8	14.5
TOTAL	60.4	57.6	71.4	62.3	64.2	78.3

ELECTRICITY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.0	.0	.0	.0
OECD Europe-Canada	.0	.0	.0	.0	.0	.0
OECD Pacific	.0	.0	.0	.0	.0	.0
Centrally Planned Eur.	.0	.0	.0	.0	.0	.0
Centrally Planned Asia	.0	.0	.2	.2	.3	.5
Middle East	.0	.0	.0	.0	.0	.0
Africa	.0	.0	.0	.0	.0	.0
Latin America	.0	.0	.0	.0	.0	.0
South and East Asia	.0	.0	.1	.2	.3	.5
TOTAL	.0	.0	.3	.4	.6	1.0

TOTAL ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	21.1	17.1	14.6	9.8	8.2	8.6
OECD Europe-Canada	15.6	12.9	12.8	8.6	7.2	7.6
OECD Pacific	4.9	4.3	4.3	3.2	2.9	3.2
Centrally Planned Eur.	7.7	9.7	11.8	10.8	11.3	14.1
Centrally Planned Asia	1.2	1.7	4.4	5.1	6.4	8.7
Middle East	.7	.8	2.1	2.4	3.1	4.3
Africa	2.2	2.9	6.6	6.2	6.2	6.9
Latin America	4.2	5.0	9.5	9.2	9.4	10.9
South and East Asia	2.8	3.2	5.6	7.4	10.1	15.0
TOTAL	60.4	57.6	71.7	62.7	64.8	79.3

TABLE A-178

ELECTRIC UTILITY ENERGY CONSUMPTION

ELECTRICITY OIL CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	1.3	2.2	1.8	1.3	1.2	1.0
OECD Europe-Canada	1.8	1.4	.9	.8	.6	.5
OECD Pacific	1.5	1.1	.5	.4	.3	.3
Centrally Planned Eur.	3.8	4.5	2.8	2.3	2.4	2.1
Centrally Planned Asia	1.1	1.9	2.4	2.5	2.3	1.8
Middle East	.8	1.0	1.1	.8	.9	.8
Africa	.4	.7	.8	.8	.9	.8
Latin America	.4	.0	.3	.8	.9	.9
South and East Asia	.8	1.4	2.0	2.5	3.2	3.3
TOTAL	11.9	14.2	12.6	12.2	12.7	11.5

ELECTRICITY GAS CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.8	6.4	8.5	5.4	4.2	3.4
OECD Europe-Canada	1.2	2.1	3.8	2.7	2.2	1.8
OECD Pacific	.4	1.0	1.8	1.4	1.2	1.0
Centrally Planned Eur.	4.6	7.9	11.8	9.3	8.4	7.1
Centrally Planned Asia	.1	1.4	8.9	9.9	8.2	6.3
Middle East	1.0	1.6	4.4	3.2	3.0	2.7
Africa	.5	1.2	3.3	3.2	3.1	2.7
Latin America	.5	.0	1.4	2.4	3.1	3.0
South and East Asia	.3	1.2	7.2	9.8	11.3	11.3
TOTAL	12.4	22.8	51.1	47.3	44.7	39.3

ELECTRICITY SOLIDS CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	14.3	11.0	5.1	2.2	2.4	2.9
OECD Europe-Canada	5.0	3.3	2.0	1.2	1.2	1.5
OECD Pacific	2.3	1.7	1.0	.6	.7	.8
Centrally Planned Eur.	13.5	13.9	7.5	3.7	4.6	6.1
Centrally Planned Asia	4.6	6.8	7.1	4.4	4.6	5.4
Middle East	.0	.2	1.0	.9	1.2	1.5
Africa	1.6	2.1	2.1	1.4	1.7	2.3
Latin America	.1	.0	.5	1.0	1.8	2.5
South and East Asia	1.8	3.1	4.7	4.2	6.3	9.7
TOTAL	43.2	42.1	31.0	19.6	24.5	32.7

ELECTRICITY HYDRO CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.3	3.9	4.4	4.7	4.7	4.8
OECD Europe-Canada	8.2	9.7	10.8	11.0	11.1	11.1
OECD Pacific	1.2	1.3	1.3	1.4	1.4	1.5
Centrally Planned Eur.	2.5	3.2	3.7	3.7	3.7	3.7
Centrally Planned Asia	1.0	2.6	7.6	10.8	11.5	11.6
Middle East	.1	.2	.5	.6	.7	.7
Africa	.2	.5	1.7	4.2	6.2	7.0
Latin America	3.3	7.7	16.5	20.0	20.6	20.7
South and East Asia	1.4	2.8	6.9	10.5	11.9	12.4
TOTAL	21.2	31.9	53.4	66.9	71.8	73.5

ENERGY REPORT: ACCELERATED POLICIES - HIGHER GROWTH

ELECTRICITY NUCLEAR CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	3.8	4.7	5.0	8.4	10.5	12.7
OECD Europe-Canada	8.4	6.8	5.6	8.5	10.9	13.2
OECD Pacific	2.0	2.5	1.8	2.8	3.7	4.5
Centrally Planned Eur.	2.0	3.4	6.0	14.8	21.1	26.7
Centrally Planned Asia	.0	.2	5.2	15.2	20.7	23.6
Middle East	.0	.0	1.1	4.8	7.6	10.0
Africa	.0	.1	1.3	4.8	7.7	10.2
Latin America	.0	.0	.5	3.8	7.7	11.1
South and East Asia	.3	.6	3.6	15.2	28.3	42.5
TOTAL	16.5	18.3	30.1	78.3	118.2	154.5

ELECTRICITY SOLAR CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.1	1.2	4.9	10.7	11.9	12.9
OECD Europe-Canada	.0	.6	2.5	5.4	6.2	6.7
OECD Pacific	.0	.3	1.2	2.9	3.4	3.7
Centrally Planned Eur.	.0	1.3	6.6	18.9	24.0	27.1
Centrally Planned Asia	.0	.5	5.7	19.4	23.6	24.0
Middle East	.0	.0	1.5	6.2	8.6	10.2
Africa	.0	.2	1.8	6.2	8.8	10.3
Latin America	.0	.0	.7	4.9	8.8	11.3
South and East Asia	.0	.3	4.3	19.4	32.3	43.2
TOTAL	.1	4.4	29.2	94.0	127.6	149.4

TOTAL ELECTRIC UTILITY ENERGY CONSUMPTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	26.6	29.4	29.7	32.7	34.9	37.7
OECD Europe-Canada	24.6	23.9	25.6	29.6	32.2	34.8
OECD Pacific	7.4	7.9	7.6	9.5	10.7	11.8
Centrally Planned Eur.	26.4	34.2	38.4	52.7	64.2	72.8
Centrally Planned Asia	6.8	13.4	36.9	62.2	70.9	72.7
Middle East	1.9	3.0	9.6	16.5	22.0	25.9
Africa	2.7	4.8	11.0	20.6	28.4	33.3
Latin America	4.3	7.7	19.9	32.9	42.9	49.5
South and East Asia	4.6	9.4	28.7	61.6	93.3	122.4
TOTAL	105.3	133.7	207.4	318.3	399.5	460.9

TABLE A-179

ENERGY CONVERSION EFFICIENCY AT ELECTRIC UTILITY POWERPLANTS
(percent)

REGION	1985	2000	2025	2050	2075	2100
United States	31.2	33.3	35.0	35.5	35.5	35.3
OECD Europe-Canada	32.5	33.5	34.4	34.1	34.5	34.5
OECD Pacific	32.4	32.9	34.2	35.8	34.6	34.7
Centrally Planned Eur.	31.4	33.0	35.2	35.3	35.7	35.3
Centrally Planned Asia	26.5	29.9	33.6	35.0	35.4	35.2
Middle East	26.3	26.7	36.5	35.2	35.5	34.7
Africa	22.2	29.2	34.5	35.0	35.2	35.1
Latin America	30.2	33.8	34.2	34.3	34.5	34.7
South and East Asia	26.1	28.7	34.1	35.2	35.6	35.4

*Includes transmission and distribution losses

TABLE A-180

SYNTHETIC PRODUCTION OF OIL AND GAS

OIL FROM SYNFUELS
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	1.8	5.5	6.4	8.2
OECD Europe-Canada	.0	.0	1.3	3.9	4.6	5.8
OECD Pacific	.0	.0	.7	2.0	2.3	2.9
Centrally Planned Eur.	.0	.0	3.4	10.3	11.9	15.3
Centrally Planned Asia	.0	.0	1.6	4.9	5.7	7.5
Middle East	.0	.0	.0	.2	.2	.2
Africa	.0	.0	4.5	13.5	15.6	19.8
Latin America	.0	.0	6.7	20.2	23.3	29.6
South and East Asia	.0	.0	3.0	8.9	10.2	13.0
TOTAL	.0	.0	23.0	69.4	80.2	102.3

GAS FROM SYNFUELS
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	6.2	8.8	8.3	6.6
OECD Europe-Canada	.0	.0	4.4	6.3	5.9	4.7
OECD Pacific	.0	.0	2.2	3.2	3.0	2.4
Centrally Planned Eur.	.0	.0	11.6	16.4	15.5	12.3
Centrally Planned Asia	.0	.0	5.5	7.7	7.3	5.8
Middle East	.0	.0	.2	.2	.2	.2
Africa	.0	.0	15.2	21.4	20.3	16.1
Latin America	.0	.0	22.8	32.1	30.4	24.2
South and East Asia	.0	.0	10.0	14.1	13.3	10.6
TOTAL	.0	.0	78.1	110.2	104.2	82.9

TABLE A-181

ENERGY USED FOR SYNTHETIC FUEL PRODUCTION BY TYPE

COAL USED IN SYNFUEL PRODUCTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	.0	.0	.0	.2
OECD Europe-Canada	.0	.0	.0	.0	.0	.0
OECD Pacific	.0	.0	.0	.0	.0	.0
Centrally Planned Eur.	.0	.0	.0	.0	.0	.4
Centrally Planned Asia	.0	.0	.0	.0	.1	.5
Middle East	.0	.0	.0	.0	.0	.0
Africa	.0	.0	.0	.0	.0	.1
Latin America	.0	.0	.0	.0	.0	.0
South and East Asia	.0	.0	.0	.0	.0	.0
TOTAL	.0	.0	.0	.0	.1	1.2

BIOMASS USED IN SYNFUEL PRODUCTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	10.7	19.0	19.5	19.5
OECD Europe-Canada	.0	.0	7.7	13.6	13.9	13.9
OECD Pacific	.0	.0	3.9	6.8	7.0	7.0
Centrally Planned Eur.	.0	.0	20.0	35.5	36.4	36.4
Centrally Planned Asia	.0	.0	9.4	16.7	17.2	17.2
Middle East	.0	.0	.3	.5	.5	.5
Africa	.0	.0	26.2	46.4	47.6	47.7
Latin America	.0	.0	39.3	69.6	71.4	71.5
South and East Asia	.0	.0	17.2	30.6	31.4	31.4
TOTAL	.0	.0	134.7	238.7	244.9	245.1

TOTAL USED IN SYNFUEL PRODUCTION
(Exajoules/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.0	.0	10.7	19.0	19.5	19.7
OECD Europe-Canada	.0	.0	7.7	13.6	13.9	13.9
OECD Pacific	.0	.0	3.9	6.8	7.0	7.0
Centrally Planned Eur.	.0	.0	20.0	35.5	36.4	36.8
Centrally Planned Asia	.0	.0	9.4	16.7	17.3	17.7
Middle East	.0	.0	.3	.5	.5	.5
Africa	.0	.0	26.2	46.4	47.6	47.8
Latin America	.0	.0	39.3	69.6	71.4	71.5
South and East Asia	.0	.0	17.2	30.6	31.4	31.4
TOTAL	.0	.0	134.7	238.7	245.0	246.3

TABLE A-182

CO_2 EMISSIONS FROM FOSSIL FUEL
(petagrams C/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	1.3	1.2	.8	.4	.3	.3
OECD Europe-Canada	.9	.9	.7	.4	.3	.3
OECD Pacific	.3	.3	.2	.1	.1	.1
Centrally Planned Eur.	1.3	1.5	1.0	.6	.7	.7
Centrally Planned Asia	.6	.9	1.4	1.1	1.0	1.0
Middle East	.1	.1	.3	.4	.4	.3
Africa	.1	.2	.1	-.2	-.1	-.1
Latin America	.2	.3	.2	-.2	-.1	-.2
South and East Asia	.3	.4	.7	.8	1.0	1.2
TOTAL	5.1	5.8	5.5	3.5	3.6	3.5

TABLE A-183

CO EMISSIONS FROM FOSSIL FUEL
(Teragrams C/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	51.0	22.7	11.6	7.3	6.1	6.3
OECD Europe-Canada	44.7	29.6	10.3	6.4	5.4	5.7
OECD Pacific	14.1	9.8	3.5	2.5	2.3	2.4
Centrally Planned Eur.	31.1	29.1	23.7	8.6	9.0	10.9
Centrally Planned Asia	6.0	6.8	11.6	6.5	7.4	8.7
Middle East	2.9	2.5	4.3	2.1	2.5	3.3
Africa	8.5	8.4	13.5	5.4	5.5	5.8
Latin America	16.3	14.5	19.2	7.8	7.9	8.8
South and East Asia	11.2	9.6	11.9	6.7	8.9	12.2
TOTAL	185.8	133.0	109.6	53.3	55.0	64.2

TABLE A-184

N_2O EMISSIONS FROM FOSSIL FUEL
(Teragrams N/Yr)

REGION	1985	2000	2025	2050	2075	2100
United States	.3	.3	.2	.1	.1	.1
OECD Europe-Canada	.1	.2	.2	.1	.0	.0
OECD Pacific	.0	.0	.0	.0	.0	.0
Centrally Planned Eur.	.3	.3	.2	.2	.2	.2
Centrally Planned Asia	.1	.2	.3	.2	.2	.2
Middle East	.0	.0	.0	.0	.0	.0
Africa	.0	.0	.0	.0	.0	.0
Latin America	.0	.0	.1	.1	.1	.2
South and East Asia	.0	.0	.2	.2	.2	.3
TOTAL	1.0	1.3	1.4	1.2	1.1	1.2

AGRICULTURAL ACTIVITIES - ALL SCENARIOS

TABLE A-185

PRODUCTION OF WHEAT
(10^6 mt)

REGION	1985	2000	2025	2050	2075	2100
United States	69.9	97.6	127.4	141.7	132.7	119.1
OECD Europe-Canada	102.4	132.0	180.5	166.1	132.9	105.2
OECD Pacific	16.6	24.3	34.0	34.3	29.2	23.8
Centrally Planned Eur.	141.3	164.6	190.6	211.9	198.4	178.0
Centrally Planned Asia	40.4	47.0	54.6	60.6	56.7	50.9
Middle East	11.7	14.6	17.3	19.0	17.7	15.9
Africa	10.9	15.1	22.0	26.4	27.4	27.8
Latin America	17.7	23.9	36.1	60.0	91.9	144.4
South and East Asia	60.1	109.1	180.8	246.2	288.2	330.2
TOTAL	471.0	628.2	843.1	966.3	975.1	995.3

TABLE A-186

PRODUCTION OF RICE
(10^6 mt)

REGION	1985	2000	2025	2050	2075	2100
United States	5.8	3.8	6.2	8.9	10.8	12.0
OECD Europe-Canada	2.0	2.7	3.7	4.7	5.1	5.2
OECD Pacific	9.6	10.6	9.3	9.5	8.2	6.5
Centrally Planned Eur.	3.2	5.7	6.4	6.9	6.2	5.1
Centrally Planned Asia	98.8	115.5	123.8	125.7	108.3	84.7
Middle East	1.4	2.0	2.8	3.3	3.2	2.9
Africa	7.4	13.3	24.4	35.6	47.7	62.2
Latin America	11.3	14.0	19.2	22.4	23.0	22.3
South and East Asia	136.2	208.9	341.0	439.0	496.4	524.6
TOTAL	275.6	376.5	536.9	655.7	709.0	725.5

TABLE A-187

PRODUCTION OF COARSE GRAINS
(10^6 mt)

REGION	1985	2000	2025	2050	2075	2100
United States	232.7	278.2	308.2	314.2	260.8	183.8
OECD Europe-Canada	144.7	206.6	279.7	292.6	253.1	188.5
OECD Pacific	9.2	26.2	50.7	86.1	120.3	143.3
Centrally Planned Eur.	160.9	203.6	267.7	311.6	295.2	237.4
Centrally Planned Asia	81.1	99.9	111.1	119.3	104.5	77.9
Middle East	7.1	9.7	14.5	18.2	18.5	16.1
Africa	56.6	85.8	127.8	155.0	155.6	133.7
Latin America	71.6	102.3	194.6	352.7	576.3	854.1
South and East Asia	51.2	62.4	79.0	78.8	67.4	51.4
TOTAL	815.2	1074.6	1433.3	1728.4	1851.7	1886.2

TABLE A-188

PRODUCTION OF MEATS
(10^6 mt c.w.)

REGION	1985	2000	2025	2050	2075	2100
United States	10.9	13.8	13.5	8.8	4.8	2.4
OECD Europe-Canada	14.2	16.5	18.9	22.6	22.9	21.3
OECD Pacific	4.8	5.7	7.3	9.5	10.6	11.0
Centrally Planned Eur.	12.1	14.0	15.3	14.8	12.1	9.2
Centrally Planned Asia	4.3	5.4	6.6	7.5	7.1	6.3
Middle East	.9	1.6	2.8	4.1	5.0	5.6
Africa	5.1	8.5	15.2	22.8	29.5	36.6
Latin America	11.6	16.5	24.5	31.7	35.0	35.7
South and East Asia	3.4	5.2	9.2	13.2	16.1	18.1
TOTAL	67.2	87.2	113.4	134.9	143.1	146.2

AGRICULTURAL ACTIVITIES - ALL SCENARIOS

TABLE A-189

PRODUCTION OF DAIRY PRODUCTS
(10^6 mt m.eq.)

REGION	1985	2000	2025	2050	2075	2100
United States	58.5	71.6	104.6	139.6	138.6	124.0
OECD Europe-Canada	142.8	151.7	168.0	177.8	145.6	112.0
OECD Pacific	22.6	28.3	32.8	33.2	25.3	17.6
Centrally Planned Eur.	153.4	178.9	188.3	178.0	126.0	81.0
Centrally Planned Asia	8.3	14.0	19.8	24.0	21.8	17.8
Middle East	6.6	10.8	17.7	23.3	23.0	20.4
Africa	19.7	32.0	54.1	76.2	83.3	86.5
Latin America	37.8	62.0	104.1	143.7	147.9	137.4
South and East Asia	54.6	85.1	167.1	314.8	450.4	589.7
TOTAL	504.4	634.5	856.2	1110.6	1161.9	1186.3

TABLE A-190

OTHER ANIMAL PRODUCTION
(10^6 mt prot.eq.)

REGION	1985	2000	2025	2050	2075	2100
United States	2.1	2.3	2.4	2.2	1.3	.7
OECD Europe-Canada	3.7	4.6	5.4	5.2	3.1	1.7
OECD Pacific	2.0	2.8	4.9	9.4	11.2	12.3
Centrally Planned Eur.	2.9	3.5	3.8	3.4	1.9	1.0
Centrally Planned Asia	4.4	6.9	13.5	26.1	31.5	35.0
Middle East	.2	.4	.7	.9	.7	.5
Africa	.9	1.6	2.6	3.4	2.8	2.2
Latin America	1.3	2.4	4.6	7.2	7.5	7.8
South and East Asia	1.8	3.0	5.2	7.9	8.1	8.2
TOTAL	19.2	27.4	43.2	65.7	68.0	69.3

TABLE A-191

AMOUNT OF FERTILIZER USE
(10^6 mt)

REGION	1985	2000	2025	2050	2075	2100
United States	10.3	11.9	12.7	10.9	9.1	6.4
OECD Europe-Canada	11.4	18.7	23.3	21.8	19.4	16.5
OECD Pacific	.8	1.1	1.6	2.0	2.7	3.0
Centrally Planned Eur.	13.5	22.4	25.4	27.6	26.5	24.0
Centrally Planned Asia	11.4	17.0	20.1	21.2	19.3	16.4
Middle East	.9	1.5	2.4	3.1	3.1	2.9
Africa	2.2	4.4	8.1	10.8	11.8	12.3
Latin America	3.1	4.7	8.3	11.0	18.8	28.8
South and East Asia	8.1	18.8	37.9	39.3	45.1	48.4
TOTAL	61.8	100.5	139.8	147.7	155.8	158.9

TABLE A-192

AMOUNT OF LAND UNDER RICE CULTIVATION
(10^6 ha)

REGION	1985	2000	2025	2050	2075	2100
United States	1.6	1.0	1.4	1.8	2.0	2.0
OECD Europe-Canada	.9	.9	1.0	1.0	1.0	.8
OECD Pacific	2.4	2.3	1.7	1.6	1.2	.9
Centrally Planned Eur.	1.7	2.5	2.4	2.4	2.1	1.8
Centrally Planned Asia	42.9	43.9	43.8	43.6	37.4	29.1
Middle East	.7	.9	1.0	1.1	1.1	1.0
Africa	3.5	5.2	7.3	8.8	9.7	9.8
Latin America	8.5	8.7	9.4	9.1	8.1	7.0
South and East Asia	85.3	103.1	131.2	155.7	163.5	158.3
TOTAL	147.4	168.4	199.2	225.1	226.2	210.6

GREENHOUSE GAS EMISSIONS: 2030 HIGH EMISSIONS - LOWER GROWTH SCENARIO

TABLE A-193

CO_2 EMISSIONS BY SOURCE
(1000 Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	5.2	6.0	8.1	8.9	10.1	12.5
Tropical Deforestation	.7	1.2	1.8	1.7	.4	.0
Cement	.1	.2	.2	.2	.3	.3
TOTAL	6.0	7.3	10.1	10.9	10.7	12.8

TABLE A-194

N_2O EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	1.1	1.3	1.7	1.9	2.1	2.4
Fertilizer	1.5	2.5	3.5	3.7	3.9	3.9
Gain of Cultivated Land	.4	.6	1.0	.9	.2	.0
Natural Emissions	6.0	6.0	6.0	6.0	6.0	6.0
Oceans/Freshwater	2.0	2.0	2.0	2.0	2.0	2.0
Tropical Deforestation	.5	.9	1.3	1.3	.3	.0
Savanna Burning/Wildfire	.3	.3	.3	.3	.3	.3
Fuelwood & Ind. Biomass	.2	.2	.2	.3	.3	.3
Agricultural Wastes	.4	.5	.5	.5	.5	.5
TOTAL	12.5	14.3	16.6	16.8	15.4	15.4

TABLE A-195

CH_4 EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	2.0	2.2	3.0	3.2	3.4	4.1
Fuel Production	80.0	90.4	130.0	139.7	158.3	192.1
Enteric Fermentation	74.5	94.5	124.6	156.0	163.6	166.9
Rice	110.0	125.7	148.7	167.9	168.8	157.1
Oceans/Freshwater	15.0	15.0	15.0	15.0	15.0	15.0
Landfills	40.0	47.3	61.9	77.4	101.6	139.4
Wetlands	115.0	115.0	115.0	115.0	115.0	115.0
Tropical Deforestation	19.8	31.5	48.8	46.9	9.8	.8
Sav. Burning/Wildfire	11.6	11.6	11.6	11.6	11.6	11.6
Fuelwood & Ind Biomass	8.3	8.5	8.8	9.2	9.6	10.0
Agricultural Wastes	15.4	16.7	18.3	18.8	17.9	16.6
Wild Ruminants/Termite	44.0	44.0	44.0	44.0	44.0	44.0
Meth. Hyd. Destab.	5.0	5.0	5.0	5.0	5.0	5.0
TOTAL	540.5	607.3	734.5	809.7	823.4	877.6

TABLE A-196

NO_x EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	23.8	26.5	33.3	35.9	39.2	47.2
Tropical Deforestation	2.2	3.4	5.3	5.1	1.1	.0
Sav. Burning/Wildfires	1.3	1.3	1.3	1.3	1.3	1.3
Fuelwood & Ind Biomass	.9	.9	1.0	1.0	1.0	1.1
Agricultural Wastes	1.7	1.8	2.0	2.0	2.0	1.8
Natural Land Sources	12.0	12.0	12.0	12.0	12.0	12.0
Lightning	9.0	9.0	9.0	9.0	9.0	9.0
TOTAL	50.8	55.0	63.8	66.4	65.5	72.5

GREENHOUSE GAS EMISSIONS: 2030 HIGH EMISSIONS - LOWER GROWTH SCENARIO

TABLE A-197

CO EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	182.5	190.3	268.9	290.3	313.4	395.1
Tropical Deforestation	135.0	214.5	332.9	319.9	66.6	5.5
Oceans	17.0	17.0	17.0	17.0	17.0	17.0
Vegetation	56.0	56.0	56.0	56.0	56.0	56.0
Burning Savanna	90.0	97.7	106.8	109.7	104.7	97.0
Wood Use	47.0	48.2	50.3	52.5	54.7	57.1
Wildfires	10.0	10.0	10.0	10.0	10.0	10.0
TOTAL	537.5	633.7	841.9	855.3	622.4	637.8

TABLE A-198

ATMOSPHERIC CONCENTRATIONS (3.0)
(ppm/ppb/ppt)

TRACE GAS	1985	2000	2025	2050	2075	2100
N2O(PPB)	300.0	314.3	343.2	373.9	396.9	412.8
CH4(PPB)	1600.0	1878.3	2451.9	2933.2	3048.8	3094.6
CO2(PPM)	345.0	370.4	428.9	503.6	581.2	670.0
CFC-11(PPT)	220.0	369.7	497.4	560.9	605.2	634.7
CFC-12(PPT)	375.0	615.7	884.5	1082.6	1252.7	1394.5
CFC-22(PPT)	80.0	222.7	983.4	2287.8	3254.2	3498.8
Equiv. CO2 (ppm)	374.1	419.9	528.3	666.2	790.4	920.1
Rad. Forcing (.001°)	1122.0	1617.2	2634.0	3703.2	4525.7	5276.7

GREENHOUSE GAS EMISSIONS: 2030 HIGH EMISSIONS - HIGHER GROWTH SCENARIO

TABLE A-199

CO_2 EMISSIONS BY SOURCE
(1000 Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	5.1	6.9	11.7	18.2	25.3	30.8
Tropical Deforestation	.7	.9	1.0	1.0	1.1	.8
Cement	.1	.2	.3	.3	.4	.4
TOTAL	5.9	8.0	12.9	19.5	26.7	32.0

TABLE A-200

N_2O EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	1.1	1.5	2.5	3.7	4.9	5.8
Fertilizer	1.5	2.5	3.5	3.7	3.9	3.9
Gain of Cultivated Land	.4	.5	.5	.6	.6	.4
Natural Emissions	6.0	6.0	6.0	6.0	6.0	6.0
Oceans/Freshwater	2.0	2.0	2.0	2.0	2.0	2.0
Tropical Deforestation	.5	.7	.7	.8	.8	.6
Savanna Burning/Wildfire	.3	.3	.3	.3	.3	.3
Fuelwood & Ind. Biomass	.2	.2	.2	.2	.2	.2
Agricultural Wastes	.4	.5	.5	.5	.5	.5
TOTAL	12.5	14.2	16.2	17.7	19.2	19.7

TABLE A-201

CH_4 EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	2.0	2.4	3.4	5.1	6.4	8.5
Fuel Production	80.0	105.8	187.5	285.3	379.5	461.7
Enteric Fermentation	74.5	94.5	124.6	156.0	163.6	166.9
Rice	110.0	125.7	148.7	167.9	168.8	157.1
Oceans/Freshwater	15.0	15.0	15.0	15.0	15.0	15.0
Landfills	40.0	52.8	80.3	129.6	196.8	219.8
Wetlands	115.0	115.0	115.0	115.0	115.0	115.0
Tropical Deforestation	19.8	24.1	26.0	27.9	29.8	20.3
Sav. Burning/Wildfire	11.6	11.6	11.6	11.6	11.6	11.6
Fuelwood & Ind Biomass	8.3	8.0	7.7	7.4	7.1	6.8
Agricultural Wastes	15.4	16.7	18.3	18.8	17.9	16.6
Wild Ruminants/Termite	44.0	44.0	44.0	44.0	44.0	44.0
Meth. Hyd. Destab.	5.0	5.0	5.0	5.0	5.0	5.0
TOTAL	540.5	620.6	787.1	988.5	1160.6	1248.3

TABLE A-202

NO_x EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	23.2	29.9	44.9	66.9	87.3	103.6
Tropical Deforestation	2.2	2.6	2.8	3.0	3.3	2.2
Sav. Burning/Wildfires	1.3	1.3	1.3	1.3	1.3	1.3
Fuelwood & Ind Biomass	.9	.9	.8	.8	.8	.7
Agricultural Wastes	1.7	1.8	2.0	2.0	2.0	1.8
Natural Land Sources	12.0	12.0	12.0	12.0	12.0	12.0
Lightning	9.0	9.0	9.0	9.0	9.0	9.0
TOTAL	50.2	57.5	72.9	95.0	115.5	130.6

GREENHOUSE GAS EMISSIONS: 2030 HIGH EMISSIONS - HIGHER GROWTH SCENARIO

TABLE A-203

CO EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	182.0	206.2	309.1	483.2	624.2	860.5
Tropical Deforestation	135.0	164.6	177.5	190.5	203.4	138.7
Oceans	17.0	17.0	17.0	17.0	17.0	17.0
Vegetation	56.0	56.0	56.0	56.0	56.0	56.0
Burning Savenna	90.0	97.7	106.8	109.7	104.7	97.0
Wood Use	47.0	45.8	44.0	42.2	40.5	38.8
Wildfires	10.0	10.0	10.0	10.0	10.0	10.0
TOTAL	537.0	597.4	720.4	908.6	1055.8	1218.0

TABLE A-204

ATMOSPHERIC CONCENTRATIONS (3.0)
(ppm/ppb/ppt)

TRACE GAS	1985	2000	2025	2050	2075	2100
N2O(PPB)	300.0	314.1	341.9	374.5	409.9	445.7
CH4(PPB)	1600.0	1889.8	2526.1	3382.4	4197.1	4734.0
CO2(PPM)	345.0	372.2	444.9	575.6	777.4	1050.2
CFC-11(PPT)	220.0	369.8	497.5	561.9	609.1	644.4
CFC-12(PPT)	375.0	615.7	884.6	1083.5	1256.7	1405.3
CFC-22(PPT)	80.0	222.1	972.5	2273.3	3343.2	3754.9
Equiv. CO2 (ppm)	374.1	422.2	550.5	785.0	1143.2	1605.3
Rad. Forcing (.001°)	1122.0	1641.2	2819.0	4490.9	6385.3	8204.7

GREENHOUSE GAS EMISSIONS: 2060 LOW EMISSIONS - LOWER GROWTH SCENARIO

TABLE A-205

CO2 EMISSIONS BY SOURCE
(1000 Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	5.1	5.4	6.1	6.0	6.0	6.7
Tropical Deforestation	.7	-.2	-.5	-.3	-.2	-.2
Cement	.1	.1	.2	.2	.1	.1
TOTAL	5.9	5.4	5.8	5.8	6.0	6.6

TABLE A-206

N2O EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	1.1	1.2	1.2	1.1	1.1	1.2
Fertilizer	1.5	2.5	3.5	3.7	3.9	3.9
Gain of Cultivated Land	.4	.2	.0	.0	.0	.0
Natural Emissions	6.0	6.0	6.0	6.0	6.0	6.0
Oceans/Freshwater	2.0	2.0	2.0	2.0	2.0	2.0
Tropical Deforestation	.5	.2	.0	.0	.0	.0
Savanna Burning/Wildfire	.3	.3	.3	.3	.3	.3
Fuelwood & Ind. Biomass	.2	.2	.2	.2	.2	.2
Agricultural Wastes	.4	.5	.5	.5	.5	.5
TOTAL	12.5	13.1	13.8	13.8	13.9	14.1

TABLE A-207

CH4 EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	2.0	2.0	1.8	1.6	1.5	1.7
Fuel Production	80.0	86.1	107.0	106.2	98.5	102.7
Enteric Fermentation	74.5	94.5	124.6	156.0	163.6	166.9
Rice	110.0	125.7	148.7	167.9	168.8	157.1
Oceans/Freshwater	15.0	15.0	15.0	15.0	15.0	15.0
Landfills	40.0	40.2	46.2	40.8	37.9	36.3
Wetlands	115.0	115.0	115.0	115.0	115.0	115.0
Tropical Deforestation	19.8	7.9	1.1	.3	.3	.0
Sav. Burning/Wildfire	11.6	11.6	11.6	11.6	11.6	11.6
Fuelwood & Ind Biomass	8.3	8.0	7.6	7.3	6.9	6.6
Agricultural Wastes	15.4	16.7	18.3	18.8	17.9	16.6
Wild Ruminants/Termite	44.0	44.0	44.0	44.0	44.0	44.0
Meth. Hyd. Destab.	5.0	5.0	5.0	5.0	5.0	5.0
TOTAL	540.5	571.6	645.7	689.3	685.9	678.5

TABLE A-208

NOx EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	23.3	23.8	19.1	13.4	12.7	14.5
Tropical Deforestation	2.2	.9	.1	.0	.0	.0
Sav. Burning/Wildfires	1.3	1.3	1.3	1.3	1.3	1.3
Fuelwood & Ind Biomass	.9	.9	.8	.8	.8	.7
Agricultural Wastes	1.7	1.8	2.0	2.0	2.0	1.8
Natural Land Sources	12.0	12.0	12.0	12.0	12.0	12.0
Lightning	9.0	9.0	9.0	9.0	9.0	9.0
TOTAL	50.3	49.6	44.3	38.5	37.7	39.2

TABLE A-209

CO EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	182.3	148.6	97.2	51.4	51.0	60.4
Tropical Deforestation	135.0	53.6	7.4	1.8	1.8	.0
Oceans	17.0	17.0	17.0	17.0	17.0	17.0
Vegetation	56.0	56.0	56.0	56.0	56.0	56.0
Burning Savanna	90.0	97.7	106.8	109.7	104.7	97.0
Wood Use	47.0	45.6	43.4	41.4	39.4	37.5
Wildfires	10.0	10.0	10.0	10.0	10.0	10.0
TOTAL	537.3	428.6	337.8	287.2	279.9	277.9

TABLE A-210

ATMOSPHERIC CONCENTRATIONS (3.0)
(ppm/ppb/ppt)

TRACE GAS	1985	2000	2025	2050	2075	2100
N_2O(PPB)	300.0	312.1	332.8	350.6	365.5	378.5
CH_4(PPB)	1600.0	1765.9	2048.2	2285.7	2316.3	2213.6
CO_2(PPM)	345.0	365.1	394.1	425.6	458.0	494.3
CFC-11(PPT)	220.0	369.1	485.5	530.7	556.6	572.6
CFC-12(PPT)	375.0	614.9	866.5	1033.3	1168.4	1278.9
CFC-22(PPT)	80.0	220.5	949.8	2159.1	3024.5	3202.2
Equiv. CO_2 (ppm)	374.1	409.0	465.7	528.8	583.2	629.0
Rad. Forcing (.001°)	1122.0	1502.5	2067.9	2634.2	3084.5	3433.9

GREENHOUSE GAS EMISSIONS: 2060 LOW EMISSIONS - HIGHER GROWTH SCENARIO

TABLE A-211

CO2 EMISSIONS BY SOURCE
(1000 Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	5.1	5.8	7.2	9.2	11.4	13.8
Tropical Deforestation	.7	-.2	-.5	-.3	-.2	-.2
Cement	.1	.2	.2	.3	.3	.3
TOTAL	5.9	5.7	7.0	9.2	11.6	14.0

TABLE A-212

N2O EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	1.1	1.3	1.4	1.7	2.0	2.4
Fertilizer	1.5	2.5	3.5	3.7	3.9	3.9
Gain of Cultivated Land	.4	.2	.0	.0	.0	.0
Natural Emissions	6.0	6.0	6.0	6.0	6.0	6.0
Oceans/Freshwater	2.0	2.0	2.0	2.0	2.0	2.0
Tropical Deforestation	.5	.2	.0	.0	.0	.0
Savanna Burning/Wildfire	.3	.3	.3	.3	.3	.3
Fuelwood & Ind. Biomass	.2	.2	.2	.1	.1	.1
Agricultural Wastes	.4	.5	.5	.5	.5	.5
TOTAL	12.5	13.1	14.0	14.3	14.8	15.2

TABLE A-213

CH4 EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	2.0	2.1	1.8	1.8	2.0	2.5
Fuel Production	80.0	91.5	129.3	158.3	174.7	200.4
Enteric Fermentation	74.5	94.5	124.6	156.0	163.6	166.9
Rice	110.0	125.7	148.7	167.9	168.8	157.1
Oceans/Freshwater	15.0	15.0	15.0	15.0	15.0	15.0
Landfills	40.0	45.7	64.6	59.3	56.4	54.9
Wetlands	115.0	115.0	115.0	115.0	115.0	115.0
Tropical Deforestation	19.8	7.9	1.1	.3	.3	.0
Sav. Burning/Wildfire	11.6	11.6	11.6	11.6	11.6	11.6
Fuelwood & Ind Biomass	8.3	7.5	6.3	5.3	4.5	3.8
Agricultural Wastes	15.4	16.7	18.3	18.8	17.9	16.6
Wild Ruminants/Termite	44.0	44.0	44.0	44.0	44.0	44.0
Meth. Hyd. Destab.	5.0	5.0	5.0	5.0	5.0	5.0
TOTAL	540.5	582.0	685.2	758.3	778.8	792.7

TABLE A-214

NOx EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	23.2	25.0	22.9	19.0	20.4	24.0
Tropical Deforestation	2.2	.9	.1	.0	.0	.0
Sav. Burning/Wildfires	1.3	1.3	1.3	1.3	1.3	1.3
Fuelwood & Ind Biomass	.9	.8	.7	.6	.5	.4
Agricultural Wastes	1.7	1.8	2.0	2.0	2.0	1.8
Natural Land Sources	12.0	12.0	12.0	12.0	12.0	12.0
Lightning	9.0	9.0	9.0	9.0	9.0	9.0
TOTAL	50.2	50.8	48.0	43.9	45.1	48.4

GREEHOUSE GAS EMISSIONS: 2060 LOW EMISSIONS - HIGHER GROWTH SCENARIO

TABLE A-215

CO EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	182.0	149.8	101.2	57.1	64.5	82.1
Tropical Deforestation	135.0	53.6	7.4	1.8	1.8	.0
Oceans	17.0	17.0	17.0	17.0	17.0	17.0
Vegetation	56.0	56.0	56.0	56.0	56.0	56.0
Burning Savanna	90.0	97.7	106.8	109.7	104.7	97.0
Wood Use	47.0	42.5	35.9	30.3	25.6	21.7
Wildfires	10.0	10.0	10.0	10.0	10.0	10.0
TOTAL	537.0	426.6	334.3	282.0	279.7	283.8

TABLE A-216

ATMOSPHERIC CONCENTRATIONS (3.0)
(ppm/ppb/ppt)

TRACE GAS	1985	2000	2025	2050	2075	2100
N2O(PPB)	300.0	312.2	333.0	352.6	370.8	388.2
CH4(PPB)	1600.0	1788.8	2145.8	2526.0	2691.8	2698.4
CO2(PPM)	345.0	365.9	401.6	454.1	527.1	623.0
CFC-11(PPT)	220.0	369.1	485.6	531.1	557.9	575.3
CFC-12(PPT)	375.0	614.9	866.6	1033.7	1169.7	1282.1
CFC-22(PPT)	80.0	220.5	952.1	2184.9	3111.9	3358.6
Equiv. CO2 (ppm)	374.1	410.8	478.4	574.1	688.8	818.5
Rad. Forcing (.001°)	1122.0	1522.0	2188.1	3010.8	3862.8	4695.6

GREENHOUSE GAS EMISSIONS: CONTROL POLICIES - LOWER GROWTH SCENARIO

TABLE A-217

CO2 EMISSIONS BY SOURCE
(1000 Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	5.1	5.5	6.1	5.8	3.9	3.0
Tropical Deforestation	.7	-.2	-.5	-.3	-.2	-.2
Cement	.1	.1	.2	.2	.1	.1
TOTAL	5.9	5.4	5.8	5.7	3.9	3.0

TABLE A-218

N2O EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	1.1	1.2	1.2	1.1	.8	.8
Fertilizer	1.5	2.3	2.8	2.6	2.4	2.2
Gain of Cultivated Land	.4	.2	.0	.0	.0	.0
Natural Emissions	6.0	6.0	6.0	6.0	6.0	6.0
Oceans/Freshwater	2.0	2.0	2.0	2.0	2.0	2.0
Tropical Deforestation	.5	.2	.0	.0	.0	.0
Savanna Burning/Wildfire	.3	.3	.3	.3	.3	.3
Fuelwood & Ind. Biomass	.2	.2	.2	.2	.2	.2
Agricultural Wastes	.4	.5	.5	.5	.5	.5
TOTAL	12.5	12.9	13.1	12.8	12.3	12.0

TABLE A-219

CH4 EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	2.0	2.0	1.7	1.6	1.3	1.4
Fuel Production	80.0	83.9	102.1	94.6	65.8	54.7
Enteric Fermentation	74.5	88.3	103.7	115.3	107.8	98.0
Rice	110.0	116.6	121.6	121.2	107.5	88.3
Oceans/Freshwater	15.0	15.0	15.0	15.0	15.0	15.0
Landfills	40.0	40.2	46.2	40.8	37.9	36.3
Wetlands	115.0	115.0	115.0	115.0	115.0	115.0
Tropical Deforestation	19.8	7.9	1.1	.3	.3	.0
Sav. Burning/Wildfire	11.6	11.6	11.6	11.6	11.6	11.6
Fuelwood & Ind Biomass	8.3	8.0	7.6	7.3	6.9	6.6
Agricultural Wastes	15.4	16.7	18.3	18.8	17.9	16.6
Wild Ruminants/Termite	44.0	44.0	44.0	44.0	44.0	44.0
Meth. Hyd. Destab.	5.0	5.0	5.0	5.0	5.0	5.0
TOTAL	540.5	554.2	592.9	590.4	535.9	492.5

TABLE A-220

NOx EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	23.3	23.9	19.3	14.2	11.5	11.6
Tropical Deforestation	2.2	.9	.1	.0	.0	.0
Sav. Burning/Wildfires	1.3	1.3	1.3	1.3	1.3	1.3
Fuelwood & Ind Biomass	.9	.9	.8	.8	.8	.7
Agricultural Wastes	1.7	1.8	2.0	2.0	2.0	1.8
Natural Land Sources	12.0	12.0	12.0	12.0	12.0	12.0
Lightning	9.0	9.0	9.0	9.0	9.0	9.0
TOTAL	50.3	49.7	44.5	39.3	36.5	36.3

GREENHOUSE GAS EMISSIONS: CONTROL POLICIES - LOWER GROWTH SCENARIO

TABLE A-221

CO EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	182.3	148.5	97.0	51.9	45.9	51.7
Tropical Deforestation	135.0	53.6	7.4	1.8	1.8	.0
Oceans	17.0	17.0	17.0	17.0	17.0	17.0
Vegetation	56.0	56.0	56.0	56.0	56.0	56.0
Burning Savanna	90.0	97.7	106.8	109.7	104.7	97.0
Wood Use	47.0	45.6	43.4	41.4	39.4	37.5
Wildfires	10.0	10.0	10.0	10.0	10.0	10.0
TOTAL	537.3	428.5	337.7	287.8	274.8	269.2

TABLE A-222

ATMOSPHERIC CONCENTRATIONS (3.0)
(ppm/ppb/ppt)

TRACE GAS	1985	2000	2025	2050	2075	2100
N2O(PPB)	300.0	311.9	331.0	345.9	356.5	363.4
CH4(PPB)	1600.0	1735.4	1889.2	1958.6	1791.5	1503.0
CO2(PPM)	345.0	365.1	394.4	424.7	445.4	454.4
CFC-11(PPT)	220.0	345.9	300.8	204.9	136.7	91.2
CFC-12(PPT)	375.0	588.2	592.4	498.2	414.5	344.9
CFC-22(PPT)	80.0	241.1	1114.9	2350.8	3152.8	3173.1
Equiv. CO2 (ppm)	374.1	406.8	449.4	491.1	510.6	504.7
Rad. Forcing (.001°)	1122.0	1479.8	1912.9	2306.4	2480.6	2424.7

GREENHOUSE GAS EMISSIONS: CONTROL POLICIES - HIGHER GROWTH SCENARIO

TABLE A-223

CO_2 EMISSIONS BY SOURCE
(1000 Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	5.1	5.8	7.0	8.5	6.2	3.9
Tropical Deforestation	.7	-.2	-.5	-.3	-.2	-.2
Cement	.1	.2	.2	.3	.3	.3
TOTAL	5.9	5.7	6.8	8.5	6.4	4.0

TABLE A-224

N_2O EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	1.1	1.3	1.4	1.6	1.4	1.3
Fertilizer	1.5	2.3	2.8	2.6	2.4	2.2
Gain of Cultivated Land	.4	.2	.0	.0	.0	.0
Natural Emissions	6.0	6.0	6.0	6.0	6.0	6.0
Oceans/Freshwater	2.0	2.0	2.0	2.0	2.0	2.0
Tropical Deforestation	.5	.2	.0	.0	.0	.0
Savanna Burning/Wildfire	.3	.3	.3	.3	.3	.3
Fuelwood & Ind. Biomass	.2	.2	.2	.1	.1	.1
Agricultural Wastes	.4	.5	.5	.5	.5	.5
TOTAL	12.5	12.9	13.3	13.2	12.8	12.4

TABLE A-225

CH_4 EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	2.0	2.0	1.7	1.8	1.7	2.0
Fuel Production	80.0	86.5	114.6	140.2	101.4	63.3
Enteric Fermentation	74.5	88.3	103.7	115.3	107.8	98.0
Rice	110.0	116.6	121.6	121.2	107.5	88.3
Oceans/Freshwater	15.0	15.0	15.0	15.0	15.0	15.0
Landfills	40.0	45.7	64.6	59.3	56.4	54.9
Wetlands	115.0	115.0	115.0	115.0	115.0	115.0
Tropical Deforestation	19.8	7.9	1.1	.3	.3	.0
Sav. Burning/Wildfire	11.6	11.6	11.6	11.6	11.6	11.6
Fuelwood & Ind Biomass	8.3	7.5	6.3	5.3	4.5	3.8
Agricultural Wastes	15.4	16.7	18.3	18.8	17.9	16.6
Wild Ruminants/Termite	44.0	44.0	44.0	44.0	44.0	44.0
Meth. Hyd. Destab.	5.0	5.0	5.0	5.0	5.0	5.0
TOTAL	540.5	561.7	622.5	652.8	588.1	517.4

TABLE A-226

NO_x EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	23.2	25.1	23.2	19.6	17.3	17.9
Tropical Deforestation	2.2	.9	.1	.0	.0	.0
Sav. Burning/Wildfires	1.3	1.3	1.3	1.3	1.3	1.3
Fuelwood & Ind Biomass	.9	.8	.7	.6	.5	.4
Agricultural Wastes	1.7	1.8	2.0	2.0	2.0	1.8
Natural Land Sources	12.0	12.0	12.0	12.0	12.0	12.0
Lightning	9.0	9.0	9.0	9.0	9.0	9.0
TOTAL	50.2	50.8	48.3	44.5	42.1	42.4

GREENHOUSE GAS EMISSIONS: CONTROL POLICIES - HIGHER GROWTH SCENARIO

TABLE A-227

CO EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	182.0	149.5	101.5	58.1	58.6	69.6
Tropical Deforestation	135.0	53.6	7.4	1.8	1.8	.0
Oceans	17.0	17.0	17.0	17.0	17.0	17.0
Vegetation	56.0	56.0	56.0	56.0	56.0	56.0
Burning Savanna	90.0	97.7	106.8	109.7	104.7	97.0
Wood Use	47.0	42.5	35.9	30.3	25.6	21.7
Wildfires	10.0	10.0	10.0	10.0	10.0	10.0
TOTAL	537.0	426.4	334.6	283.0	273.8	271.3

TABLE A-228

ATMOSPHERIC CONCENTRATIONS (3.0)
(ppm/ppb/ppt)

TRACE GAS	1985	2000	2025	2050	2075	2100
N2O(PPB)	300.0	311.9	331.1	347.5	360.3	369.0
CH4(PPB)	1600.0	1754.4	1963.6	2156.1	2034.0	1642.4
CO2(PPM)	345.0	365.9	401.0	448.5	492.7	515.1
CFC-11(PPT)	220.0	345.9	300.8	205.0	136.9	91.5
CFC-12(PPT)	375.0	588.2	592.4	498.3	414.8	345.4
CFC-22(PPT)	80.0	241.1	1116.2	2374.3	3235.2	3248.5
Equiv. CO2 (ppm)	374.1	408.6	460.3	527.4	577.7	580.9
Rad. Forcing (.001°)	1122.0	1497.5	2015.4	2623.0	3038.6	3063.6

GREENHOUSE GAS EMISSIONS: ACCELERATED POLICIES - LOWER GROWTH SCENARIO

TABLE A-229

CO_2 EMISSIONS BY SOURCE
(1000 Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	5.1	5.5	5.2	2.5	2.1	1.8
Tropical Deforestation	.7	-.2	-.5	-.3	-.2	-.2
Cement	.1	.1	.2	.2	.1	.1
TOTAL	6.0	5.4	4.9	2.4	2.1	1.8

TABLE A-230

N_2O EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	1.0	1.2	1.1	.9	.9	1.0
Fertilizer	1.6	2.3	2.8	2.6	2.4	2.2
Gain of Cultivated Land	.4	.2	.0	.0	.0	.0
Natural Emissions	6.0	6.0	6.0	6.0	6.0	6.0
Oceans/Freshwater	2.0	2.0	2.0	2.0	2.0	2.0
Tropical Deforestation	.5	.2	.0	.0	.0	.0
Savanna Burning/Wildfire	.3	.3	.3	.3	.3	.3
Fuelwood & Ind. Biomass	.2	.2	.2	.2	.2	.2
Agricultural Wastes	.4	.4	.5	.5	.5	.5
TOTAL	12.5	12.9	13.0	12.6	12.4	12.2

TABLE A-231

CH_4 EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	2.0	1.9	1.7	1.6	1.7	1.9
Fuel Production	80.0	90.8	81.7	40.4	33.2	29.9
Enteric Fermentation	75.2	88.3	103.7	115.3	107.8	98.0
Rice	109.4	116.6	121.6	121.2	107.9	91.2
Oceans/Freshwater	15.0	15.0	15.0	15.0	15.0	15.0
Landfills	40.0	40.2	46.2	40.8	37.9	36.3
Wetlands	115.0	115.0	115.0	115.0	115.0	115.0
Tropical Deforestation	19.8	7.9	1.1	.3	.3	.0
Sav. Burning/Wildfire	11.6	11.6	11.6	11.6	11.6	11.6
Fuelwood & Ind Biomass	8.3	8.0	7.6	7.3	6.9	6.6
Agricultural Wastes	15.4	16.5	18.2	19.2	19.5	17.8
Wild Ruminants/Termite	44.0	44.0	44.0	44.0	44.0	44.0
Meth. Hyd. Destab.	5.0	5.0	5.0	5.0	5.0	5.0
TOTAL	540.7	560.8	572.4	536.7	505.7	472.4

TABLE A-232

NO_x EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	24.2	24.0	21.0	16.8	16.5	17.6
Tropical Deforestation	2.2	.9	.1	.0	.0	.0
Sav. Burning/Wildfires	1.3	1.3	1.3	1.3	1.3	1.3
Fuelwood & Ind Biomass	.9	.9	.8	.8	.8	.7
Agricultural Wastes	1.7	1.8	2.0	2.1	2.1	1.9
Natural Land Sources	12.0	12.0	12.0	12.0	12.0	12.0
Lightning	9.0	9.0	9.0	9.0	9.0	9.0
TOTAL	51.2	49.8	46.2	42.0	41.7	42.5

GREENHOUSE GAS EMISSIONS: ACCELERATED POLICIES - LOWER GROWTH SCENARIO

TABLE A-233

CO EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	185.8	133.6	98.7	57.4	61.7	71.7
Tropical Deforestation	135.0	53.6	7.4	1.8	1.8	.0
Oceans	17.0	17.0	17.0	17.0	17.0	17.0
Vegetation	56.0	56.0	56.0	56.0	56.0	56.0
Burning Savanna	90.0	96.4	106.4	112.2	113.9	103.9
Wood Use	47.0	45.6	43.4	41.4	39.4	37.5
Wildfires	10.0	10.0	10.0	10.0	10.0	10.0
TOTAL	540.8	412.3	338.9	295.9	299.8	296.0

TABLE A-234

ATMOSPHERIC CONCENTRATIONS (3.0)
(ppm/ppb/ppt)

TRACE GAS	1985	2000	2025	2050	2075	2100
N2O(PPB)	300.0	311.8	330.4	344.6	354.8	362.7
CH4(PPB)	1600.0	1753.0	1868.7	1754.9	1545.4	1321.8
CO2(PPM)	345.0	364.8	390.7	401.7	401.6	400.8
CFC-11(PPT)	220.0	345.9	300.8	204.8	136.5	91.0
CFC-12(PPT)	375.0	588.2	592.4	498.1	414.3	344.5
CFC-22(PPT)	80.0	241.3	1115.0	2292.9	2966.1	2945.3
Equiv. CO2 (ppm)	374.1	407.2	445.3	458.0	450.3	437.1
Rad. Forcing (.001^{0})	1122.0	1482.0	1871.3	1995.1	1922.1	1789.2

GREENHOUSE GAS EMISSIONS: ACCELERATED POLICIES - HIGHER GROWTH SCENARIO

TABLE A-235

CO2 EMISSIONS BY SOURCE
(1000 Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	5.1	5.8	5.5	3.5	3.6	3.5
Tropical Deforestation	.7	-.2	-.5	-.3	-.2	-.2
Cement	.1	.2	.2	.3	.3	.3
TOTAL	6.0	5.8	5.3	3.5	3.8	3.6

TABLE A-236

N2O EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	1.0	1.3	1.4	1.2	1.1	1.2
Fertilizer	1.6	2.3	2.8	2.6	2.4	2.2
Gain of Cultivated Land	.4	.2	.0	.0	.0	.0
Natural Emissions	6.0	6.0	6.0	6.0	6.0	6.0
Oceans/Freshwater	2.0	2.0	2.0	2.0	2.0	2.0
Tropical Deforestation	.5	.2	.0	.0	.0	.0
Savanna Burning/Wildfire	.3	.3	.3	.3	.3	.3
Fuelwood & Ind. Biomass	.2	.2	.2	.1	.1	.1
Agricultural Wastes	.4	.5	.5	.5	.5	.5
TOTAL	12.5	12.9	13.2	12.8	12.5	12.3

TABLE A-237

CH4 EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	2.0	1.9	2.0	1.6	1.7	1.9
Fuel Production	80.0	95.7	86.4	57.0	67.5	74.9
Enteric Fermentation	75.2	88.3	103.7	115.3	107.8	98.0
Rice	109.4	116.6	121.6	121.2	107.9	91.2
Oceans/Freshwater	15.0	15.0	15.0	15.0	15.0	15.0
Landfills	40.0	45.7	64.6	59.3	56.4	54.9
Wetlands	115.0	115.0	115.0	115.0	115.0	115.0
Tropical Deforestation	19.8	7.9	1.1	.3	.3	.0
Sav. Burning/Wildfire	11.6	11.6	11.6	11.6	11.6	11.6
Fuelwood & Ind Biomass	8.3	7.5	6.3	5.3	4.5	3.8
Agricultural Wastes	15.4	16.7	18.3	18.8	17.9	16.6
Wild Ruminants/Termite	44.0	44.0	44.0	44.0	44.0	44.0
Meth. Hyd. Destab.	5.0	5.0	5.0	5.0	5.0	5.0
TOTAL	540.7	570.8	594.5	569.4	554.5	531.8

TABLE A-238

NOx EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	24.2	25.4	28.4	20.6	19.5	19.9
Tropical Deforestation	2.2	.9	.1	.0	.0	.0
Sav. Burning/Wildfires	1.3	1.3	1.3	1.3	1.3	1.3
Fuelwood & Ind Biomass	.9	.8	.7	.6	.5	.4
Agricultural Wastes	1.7	1.8	2.0	2.0	2.0	1.8
Natural Land Sources	12.0	12.0	12.0	12.0	12.0	12.0
Lightning	9.0	9.0	9.0	9.0	9.0	9.0
TOTAL	51.2	51.1	53.5	45.6	44.2	44.4

GREENHOUSE GAS EMISSIONS: ACCELERATED POLICIES - HIGHER GROWTH SCENARIO

TABLE A-239

CO EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	185.8	133.0	109.6	53.3	55.0	64.2
Tropical Deforestation	135.0	53.6	7.4	1.8	1.8	.0
Oceans	17.0	17.0	17.0	17.0	17.0	17.0
Vegetation	56.0	56.0	56.0	56.0	56.0	56.0
Burning Savanna	90.0	97.7	106.8	109.7	104.7	97.0
Wood Use	47.0	42.5	35.9	30.3	25.6	21.7
Wildfires	10.0	10.0	10.0	10.0	10.0	10.0
TOTAL	540.8	409.9	342.7	278.1	270.2	265.9

TABLE A-240

ATMOSPHERIC CONCENTRATIONS (3.0)
(ppm/ppb/ppt)

TRACE GAS	1985	2000	2025	2050	2075	2100
N2O(PPB)	300.0	311.9	330.7	345.6	356.5	364.6
CH4(PPB)	1600.0	1778.5	1916.7	1843.2	1709.0	1560.1
CO2(PPM)	345.0	366.1	395.9	413.2	424.7	438.3
CFC-11(PPT)	220.0	345.9	300.8	204.9	136.6	91.1
CFC-12(PPT)	375.0	588.2	592.4	498.2	414.5	344.8
CFC-22(PPT)	80.0	241.3	1112.9	2290.0	3012.0	3090.3
Equiv. CO2 (ppm)	374.1	409.5	453.9	474.8	483.9	489.8
Rad. Forcing (.001°)	1122.0	1507.0	1956.1	2156.1	2237.3	2294.1

GREENHOUSE GAS EMISSIONS: 2030 HIGH EMISSIONS - AVERAGE SCENARIO

TABLE A-241

CO_2 EMISSIONS BY SOURCE
(1000 Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	5.1	6.5	9.9	13.5	17.7	21.7
Tropical Deforestation	.7	1.0	1.4	1.4	.7	.4
Cement	.1	.2	.2	.3	.3	.3
TOTAL	6.0	7.7	11.5	15.2	18.7	22.4

TABLE A-242

N_2O EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	1.1	1.4	2.1	2.8	3.5	4.1
Fertilizer	1.5	2.5	3.5	3.7	3.9	3.9
Gain of Cultivated Land	.4	.6	.8	.8	.4	.2
Natural Emissions	6.0	6.0	6.0	6.0	6.0	6.0
Oceans/Freshwater	2.0	2.0	2.0	2.0	2.0	2.0
Tropical Deforestation	.5	.8	1.0	1.0	.5	.3
Savanna Burning/Wildfire	.3	.3	.3	.3	.3	.3
Fuelwood & Ind. Biomass	.2	.2	.2	.2	.2	.2
Agricultural Wastes	.4	.5	.5	.5	.5	.5
TOTAL	12.5	14.2	16.4	17.3	17.3	17.6

TABLE A-243

CH_4 EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	2.0	2.3	3.2	4.1	4.9	6.3
Fuel Production	80.0	98.1	158.7	212.5	268.9	326.9
Enteric Fermentation	74.5	94.5	124.6	156.0	163.6	166.9
Rice	110.0	125.7	148.7	167.9	168.8	157.1
Oceans/Freshwater	15.0	15.0	15.0	15.0	15.0	15.0
Landfills	40.0	50.1	71.1	103.5	149.2	179.6
Wetlands	115.0	115.0	115.0	115.0	115.0	115.0
Tropical Deforestation	19.8	27.8	37.4	37.4	19.8	10.6
Sav. Burning/Wildfire	11.6	11.6	11.6	11.6	11.6	11.6
Fuelwood & Ind Biomass	8.3	8.3	8.3	8.3	8.4	8.4
Agricultural Wastes	15.4	16.7	18.3	18.8	17.9	16.6
Wild Ruminants/Termite	44.0	44.0	44.0	44.0	44.0	44.0
Meth. Hyd. Destab.	5.0	5.0	5.0	5.0	5.0	5.0
TOTAL	540.5	613.9	760.8	899.1	992.0	1062.9

TABLE A-244

NO_x EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	23.5	28.2	39.1	51.4	63.2	75.4
Tropical Deforestation	2.2	3.0	4.1	4.1	2.2	1.2
Sav. Burning/Wildfires	1.3	1.3	1.3	1.3	1.3	1.3
Fuelwood & Ind Biomass	.9	.9	.9	.9	.9	.9
Agricultural Wastes	1.7	1.8	2.0	2.0	2.0	1.8
Natural Land Sources	12.0	12.0	12.0	12.0	12.0	12.0
Lightning	9.0	9.0	9.0	9.0	9.0	9.0
TOTAL	50.5	56.2	68.3	80.7	90.5	101.5

GREENHOUSE GAS EMISSIONS: 2030 HIGH EMISSIONS - AVERAGE SCENARIO

TABLE A-245

CO EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	182.2	198.3	289.0	386.8	468.8	627.8
Tropical Deforestation	135.0	189.6	255.2	255.2	135.0	72.1
Oceans	17.0	17.0	17.0	17.0	17.0	17.0
Vegetation	56.0	56.0	56.0	56.0	56.0	56.0
Burning Savanna	90.0	97.7	106.8	109.7	104.7	97.0
Wood Use	47.0	47.0	47.1	47.3	47.6	48.0
Wildfires	10.0	10.0	10.0	10.0	10.0	10.0
TOTAL	537.2	615.6	781.2	881.9	839.1	927.9

TABLE A-246

ATMOSPHERIC CONCENTRATIONS (3.0)
(ppm/ppb/ppt)

TRACE GAS	1985	2000	2025	2050	2075	2100
N2O(PPB)	300.0	314.2	342.5	374.2	403.4	429.3
CH4(PPB)	1600.0	1884.1	2489.0	3157.8	3623.0	3914.3
CO2(PPM)	345.0	371.3	436.9	539.6	679.3	860.1
CFC-11(PPT)	220.0	369.8	497.5	561.4	607.2	639.6
CFC-12(PPT)	375.0	615.7	884.5	1083.1	1254.7	1399.9
CFC-22(PPT)	80.0	222.4	978.0	2280.6	3298.7	3626.9
Equiv. CO2 (ppm)	374.1	421.3	539.6	723.8	953.7	1223.5
Rad. Forcing (.001°)	1122.0	1629.2	2726.5	4097.0	5455.5	6740.7

GREENHOUSE GAS EMISSIONS: 2060 LOW EMISSIONS - AVERAGE SCENARIO

TABLE A-247

CO2 EMISSIONS BY SOURCE
(1000 Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	5.1	5.6	6.6	7.6	8.7	10.3
Tropical Deforestation	.7	-.2	-.5	-.3	-.2	-.2
Cement	.1	.2	.2	.2	.2	.2
TOTAL	5.9	5.5	6.4	7.5	8.8	10.3

TABLE A-248

N2O EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	1.1	1.2	1.3	1.4	1.5	1.8
Fertilizer	1.5	2.5	3.5	3.7	3.9	3.9
Gain of Cultivated Land	.4	.2	.0	.0	.0	.0
Natural Emissions	6.0	6.0	6.0	6.0	6.0	6.0
Oceans/Freshwater	2.0	2.0	2.0	2.0	2.0	2.0
Tropical Deforestation	.5	.2	.0	.0	.0	.0
Savanna Burning/Wildfire	.3	.3	.3	.3	.3	.3
Fuelwood & Ind. Biomass	.2	.2	.2	.2	.2	.1
Agricultural Wastes	.4	.5	.5	.5	.5	.5
TOTAL	12.5	13.1	13.9	14.1	14.3	14.6

TABLE A-249

CH4 EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	2.0	2.1	1.8	1.7	1.8	2.1
Fuel Production	80.0	88.8	118.2	132.2	136.6	151.5
Enteric Fermentation	74.5	94.5	124.6	156.0	163.6	166.9
Rice	110.0	125.7	148.7	167.9	168.8	157.1
Oceans/Freshwater	15.0	15.0	15.0	15.0	15.0	15.0
Landfills	40.0	43.0	55.4	50.0	47.1	45.6
Wetlands	115.0	115.0	115.0	115.0	115.0	115.0
Tropical Deforestation	19.8	7.9	1.1	.3	.3	.0
Sav. Burning/Wildfire	11.6	11.6	11.6	11.6	11.6	11.6
Fuelwood & Ind Biomass	8.3	7.7	7.0	6.3	5.7	5.2
Agricultural Wastes	15.4	16.7	18.3	18.8	17.9	16.6
Wild Ruminants/Termite	44.0	44.0	44.0	44.0	44.0	44.0
Meth. Hyd. Destab.	5.0	5.0	5.0	5.0	5.0	5.0
TOTAL	540.5	576.8	665.4	723.8	732.4	735.6

TABLE A-250

NOx EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	23.2	24.4	21.0	16.2	16.5	19.2
Tropical Deforestation	2.2	.9	.1	.0	.0	.0
Sav. Burning/Wildfires	1.3	1.3	1.3	1.3	1.3	1.3
Fuelwood & Ind Biomass	.9	.8	.8	.7	.6	.6
Agricultural Wastes	1.7	1.8	2.0	2.0	2.0	1.8
Natural Land Sources	12.0	12.0	12.0	12.0	12.0	12.0
Lightning	9.0	9.0	9.0	9.0	9.0	9.0
TOTAL	50.2	50.2	46.1	41.2	41.4	43.8

GREENHOUSE GAS EMISSIONS: 2060 LOW EMISSIONS - AVERAGE SCENARIO

TABLE A-251

CO EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	182.2	149.2	99.2	54.2	57.7	71.3
Tropical Deforestation	135.0	53.6	7.4	1.8	1.8	.0
Oceans	17.0	17.0	17.0	17.0	17.0	17.0
Vegetation	56.0	56.0	56.0	56.0	56.0	56.0
Burning Savanna	90.0	97.7	106.8	109.7	104.7	97.0
Wood Use	47.0	44.1	39.7	35.8	32.5	29.6
Wildfires	10.0	10.0	10.0	10.0	10.0	10.0
TOTAL	537.2	427.6	336.1	284.6	279.8	280.9

TABLE A-252

ATMOSPHERIC CONCENTRATIONS (3.0)
(ppm/ppb/ppt)

TRACE GAS	1985	2000	2025	2050	2075	2100
N2O(PPB)	300.0	312.1	332.9	351.6	368.2	383.3
CH4(PPB)	1600.0	1777.4	2097.0	2405.8	2503.8	2455.6
CO2(PPM)	345.0	365.5	397.9	439.8	492.4	557.9
CFC-11(PPT)	220.0	369.1	485.5	530.9	557.3	573.9
CFC-12(PPT)	375.0	614.9	866.5	1033.5	1169.0	1280.5
CFC-22(PPT)	80.0	220.5	951.0	2171.9	3070.4	3285.3
Equiv. CO2 (ppm)	374.1	409.9	472.1	551.0	635.3	721.5
Rad. Forcing (.001°)	1122.0	1512.3	2128.3	2824.4	3481.1	4083.9

GREENHOUSE GAS EMISSIONS: CONTROL POLICIES - AVERAGE SCENARIO

TABLE A-253

CO2 EMISSIONS BY SOURCE
(1000 Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	5.1	5.6	6.5	7.2	5.0	3.5
Tropical Deforestation	.7	-.2	-.5	-.3	-.2	-.2
Cement	.1	.2	.2	.2	.2	.2
TOTAL	5.9	5.6	6.3	7.1	5.1	3.5

TABLE A-254

N2O EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	1.1	1.2	1.3	1.4	1.1	1.1
Fertilizer	1.5	2.3	2.8	2.6	2.4	2.2
Gain of Cultivated Land	.4	.2	.0	.0	.0	.0
Natural Emissions	6.0	6.0	6.0	6.0	6.0	6.0
Oceans/Freshwater	2.0	2.0	2.0	2.0	2.0	2.0
Tropical Deforestation	.5	.2	.0	.0	.0	.0
Savanna Burning/Wildfire	.3	.3	.3	.3	.3	.3
Fuelwood & Ind. Biomass	.2	.2	.2	.2	.2	.1
Agricultural Wastes	.4	.5	.5	.5	.5	.5
TOTAL	12.5	12.9	13.2	13.0	12.5	12.2

TABLE A-255

CH4 EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	2.0	2.0	1.7	1.7	1.5	1.7
Fuel Production	80.0	85.2	108.3	117.4	83.6	59.0
Enteric Fermentation	74.5	88.3	103.7	115.3	107.8	98.0
Rice	110.0	116.6	121.6	121.2	107.5	88.3
Oceans/Freshwater	15.0	15.0	15.0	15.0	15.0	15.0
Landfills	40.0	43.0	55.4	50.0	47.1	45.6
Wetlands	115.0	115.0	115.0	115.0	115.0	115.0
Tropical Deforestation	19.8	7.9	1.1	.3	.3	.0
Sav. Burning/Wildfire	11.6	11.6	11.6	11.6	11.6	11.6
Fuelwood & Ind Biomass	8.3	7.7	7.0	6.3	5.7	5.2
Agricultural Wastes	15.4	16.7	18.3	18.8	17.9	16.6
Wild Ruminants/Termite	44.0	44.0	44.0	44.0	44.0	44.0
Meth. Hyd. Destab.	5.0	5.0	5.0	5.0	5.0	5.0
TOTAL	540.5	557.9	607.7	621.6	562.0	504.9

TABLE A-257

NOx EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	23.2	24.5	21.2	16.9	14.4	14.7
Tropical Deforestation	2.2	.9	.1	.0	.0	.0
Sav. Burning/Wildfires	1.3	1.3	1.3	1.3	1.3	1.3
Fuelwood & Ind Biomass	.9	.8	.8	.7	.6	.6
Agricultural Wastes	1.7	1.8	2.0	2.0	2.0	1.8
Natural Land Sources	12.0	12.0	12.0	12.0	12.0	12.0
Lightning	9.0	9.0	9.0	9.0	9.0	9.0
TOTAL	50.2	50.3	46.4	41.9	39.3	39.4

TABLE A-258

CO EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	182.2	149.0	99.3	55.0	52.2	60.6
Tropical Deforestation	135.0	53.6	7.4	1.8	1.8	.0
Oceans	17.0	17.0	17.0	17.0	17.0	17.0
Vegetation	56.0	56.0	56.0	56.0	56.0	56.0
Burning Savanna	90.0	97.7	106.8	109.7	104.7	97.0
Wood Use	47.0	44.1	39.7	35.8	32.5	29.6
Wildfires	10.0	10.0	10.0	10.0	10.0	10.0
TOTAL	537.2	427.4	336.1	285.4	274.3	270.2

TABLE A-259

ATMOSPHERIC CONCENTRATIONS (3.0)
(ppm/ppb/ppt)

TRACE GAS	1985	2000	2025	2050	2075	2100
N2O(PPB)	300.0	311.9	331.0	346.7	358.4	366.2
CH4(PPB)	1600.0	1744.9	1926.4	2057.3	1912.5	1572.2
CO2(PPM)	345.0	365.5	397.7	436.6	469.0	484.5
CFC-11(PPT)	220.0	345.9	300.8	204.9	136.8	91.3
CFC-12(PPT)	375.0	588.2	592.4	498.2	414.7	345.1
CFC-22(PPT)	80.0	241.1	1115.6	2362.9	3195.6	3211.5
Equiv. CO2 (ppm)	374.1	407.7	454.8	509.3	543.7	541.9
Rad. Forcing (.001°)	1122.0	1488.7	1964.5	2467.1	2763.5	2748.9

GREENHOUSE GAS EMISSIONS: ACCELERATED POLICIES - AVERAGE SCENARIO

TABLE A-260

CO2 EMISSIONS BY SOURCE
(1000 Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	5.1	5.7	5.4	3.0	2.9	2.7
Tropical Deforestation	.7	-.2	-.5	-.3	-.2	-.2
Cement	.1	.2	.2	.2	.2	.2
TOTAL	6.0	5.6	5.1	2.9	3.0	2.7

TABLE A-261

N2O EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	1.0	1.2	1.2	1.0	1.0	1.1
Fertilizer	1.6	2.3	2.8	2.6	2.4	2.2
Gain of Cultivated Land	.4	.2	.0	.0	.0	.0
Natural Emissions	6.0	6.0	6.0	6.0	6.0	6.0
Oceans/Freshwater	2.0	2.0	2.0	2.0	2.0	2.0
Tropical Deforestation	.5	.2	.0	.0	.0	.0
Savanna Burning/Wildfire	.3	.3	.3	.3	.3	.3
Fuelwood & Ind. Biomass	.2	.2	.2	.2	.2	.1
Agricultural Wastes	.4	.5	.5	.5	.5	.5
TOTAL	12.5	12.9	13.1	12.7	12.5	12.3

TABLE A-262

CH4 EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	2.0	1.9	1.9	1.6	1.7	1.9
Fuel Production	80.0	93.3	84.0	48.7	50.3	52.4
Enteric Fermentation	75.2	88.3	103.7	115.3	107.8	98.0
Rice	109.4	116.6	121.6	121.2	107.9	91.2
Oceans/Freshwater	15.0	15.0	15.0	15.0	15.0	15.0
Landfills	40.0	43.0	55.4	50.0	47.1	45.6
Wetlands	115.0	115.0	115.0	115.0	115.0	115.0
Tropical Deforestation	19.8	7.9	1.1	.3	.3	.0
Sav. Burning/Wildfire	11.6	11.6	11.6	11.6	11.6	11.6
Fuelwood & Ind Biomass	8.3	7.7	7.0	6.3	5.7	5.2
Agricultural Wastes	15.4	16.6	18.2	19.0	18.7	17.2
Wild Ruminants/Termite	44.0	44.0	44.0	44.0	44.0	44.0
Meth. Hyd. Destab.	5.0	5.0	5.0	5.0	5.0	5.0
TOTAL	540.7	565.8	583.5	553.0	530.1	502.1

TABLE A-263

NOx EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	24.2	24.7	24.7	18.7	18.0	18.8
Tropical Deforestation	2.2	.9	.1	.0	.0	.0
Sav. Burning/Wildfires	1.3	1.3	1.3	1.3	1.3	1.3
Fuelwood & Ind Biomass	.9	.8	.8	.7	.6	.6
Agricultural Wastes	1.7	1.8	2.0	2.1	2.0	1.9
Natural Land Sources	12.0	12.0	12.0	12.0	12.0	12.0
Lightning	9.0	9.0	9.0	9.0	9.0	9.0
TOTAL	51.2	50.5	49.9	43.8	42.9	43.5

GREENHOUSE GAS EMISSIONS: ACCELERATED POLICIES - AVERAGE SCENARIO

TABLE A-264

CO EMISSIONS BY SOURCE
(Teragrams/Yr)

SOURCE	1985	2000	2025	2050	2075	2100
Commercial Energy	185.8	133.3	104.2	55.4	58.4	68.0
Tropical Deforestation	135.0	53.6	7.4	1.8	1.8	.0
Oceans	17.0	17.0	17.0	17.0	17.0	17.0
Vegetation	56.0	56.0	56.0	56.0	56.0	56.0
Burning Savanna	90.0	97.1	106.6	110.9	109.3	100.4
Wood Use	47.0	44.1	39.7	35.8	32.5	29.6
Wildfires	10.0	10.0	10.0	10.0	10.0	10.0
TOTAL	540.8	411.1	340.8	287.0	285.0	281.0

TABLE A-265

ATMOSPHERIC CONCENTRATIONS (3.0)
(ppm/ppb/ppt)

TRACE GAS	1985	2000	2025	2050	2075	2100
N2O(PPB)	300.0	311.8	330.5	345.0	355.7	363.6
CH4(PPB)	1600.0	1765.7	1892.7	1799.1	1627.0	1440.3
CO2(PPM)	345.0	365.4	393.3	407.4	413.2	419.5
CFC-11(PPT)	220.0	345.9	300.8	204.8	136.6	91.0
CFC-12(PPT)	375.0	588.2	592.4	498.1	414.4	344.7
CFC-22(PPT)	80.0	241.3	1114.0	2291.4	2989.7	3020.6
Equiv. CO2 (ppm)	374.1	408.1	449.4	466.6	467.1	463.0
Rad. Forcing (.001°)	1122.0	1466.1	1780.1	1938.1	2019.8	2002.3

PART TWO

This is Part Two of the Appendix. Part Two was prepared by the Netherlands and discusses the development of the scenarios using the Integrated Model for the Assessment of the Greenhouse Effect (IMAGE), which was developed by Rijksinstituut Voor Volksgezondheid En Milieuhygiene (RIVM), the research institute for the Netherlands' Ministry of Housing, Physical Planning and Environment.

Development of Emissions Scenarios
for the IPCC
Response Strategies Working Group

Appendix to the report of the Expert Group on Emission Scenarios
of the
Response Strategies Working Group
of the
Intergovernmental Panel on Climate Change

Michel den Elzen
Rob Swart
Jan Rotmans

Netherlands Institute for Public Health and Environmental Protection

appendix provides the results of the IMAGE calculations so that they can be compared with the ASF data presented in the first part of the Appendix.

2. METHODOLOGY

IMAGE is a parameterized, science-based policy model. It is an interdisciplinary, integrated framework used for calculating the impact of historical and future emissions of greenhouse gases on global temperature, sea level rise, and on ecological and socio-economic interests in specific regions. The model consists of a number of coupled modules which cover the complete cause-effect relationship, and can be used to derive the allowable emission rates for the different trace gases from predetermined effect-related targets.

Model Description

The greenhouse problem is modelled as a dynamic system with discrete time steps of one year and a simulation period of 200 years, from 1900 to 2100. In each iteration the next state is computed as a function of the present state, the functional interrelationships between the modules, and the scenarios. The system has a global character, entailing the absence of spatial dimensions. IMAGE consists of independent, interlinked modules, the modular structure allowing improvements to be implemented gradually without affecting the basic structure. The framework of IMAGE consists of emission modules, concentration modules, a climate module, a sea level rise module and socio-economic impact modules for the Netherlands (see Figure 1). These modules are linked in a natural way, with output of one module serving as input for another.

In the emission modules, current estimates of historical emissions characterize the period 1900 to 1985; alternative scenarios can be defined for the period 1985 to 2100. The underlying scenario

1. INTRODUCTION

This Appendix accompanies the report of the Expert Group on Emission Scenarios of the Response Strategies Working Group of the Intergovernmental Panel on Climate Change. In addition to jointly preparing the text of the main report with the U.S., the Netherlands contributed by performing a number of calculations with the Integrated Model for the Assessment of the Greenhouse Effect (IMAGE):

- The results of the EPA Atmospheric Stabilization Framework (ASF) were evaluated by reviewing the assumptions underlying the EPA emissions scenarios and then estimating the CO_2 equivalent concentrations from these scenarios using IMAGE.

- In order to underscore the importance of the coming decades for policy decisions, a delayed response analysis was performed.

- Because no agreement could be reached on the timing of climate change control policies, an alternative trajectory for the lowest emission scenario was developed.

- To stress the interdependency of control options for fossil fuel, carbon dioxide, and other greenhouse gases within the bounds of a normative scenario, an additional analysis was performed with higher emission estimates for CH_4, CO and N_2O.

The conclusions of these analyses are incorporated into the main document. This part of the tetrachloride), these substances are not taken into account in the calculations presented here.

The calculated trace gas concentrations serve as an input for the climate module, which is a parameterized radiative convective model (Wigley, 1987). The resulting global mean equilibrium surface temperature can be calculated by multiplying the radiative forcing by a climate feedback factor.

The effects of global warming on the potential sea level are determined by thermal expansion of ocean water, the melting of ice caps (Alpine and Arctic) and the observed trend of 15-20 centimeters per century sea level rise (Oerlemans, 1987).

The temperature increase and sea level rise are input for the socio-economic impacts modules, which estimate the costs and benefits of investing in coastal defence, as well as changes in energy use and water management resulting from adaptation to regional climate change and sea level rise (den Elzen and Rotmans, in press). However, these modules were not used for the calculations presented in this appendix.

3. RESULTS

IMAGE runs were performed with the same input emission scenarios as used in the ASF-calculations:

- Equivalent CO_2 doubling in 2030: **2030 High Emissions Scenario**
- Equivalent CO_2 doubling in 2060: **2060 Low Emissions Scenario**
- Equivalent CO_2 doubling in 2090: **Control Policies Scenario**
- Stabilization well below doubling: **Accelerated Policies Scenario**
- RIVM stabilization: **Alternative Accelerated Policies Scenario**

assumptions are based on a study of the sources of both natural and anthropogenic trace gas emissions. Emissions from energy supply are based on the Edmonds-Reilly Long-Term Global Energy-CO_2 Model (Edmonds and Reilly, 1986), while emissions from agriculture and industry are based on input-output spreadsheet models. Six trace gases have been evaluated in this study: CO_2, CH_4, CO, N_2O, CFC-11 and CFC-12. Additionally, emissions and concentrations of other trace gases influencing the atmospheric chemistry of CH_4 are introduced, such as CO, NMHC, and OH.

The emission modules provide the input for the concentration modules. The emission and concentration of CO_2 is linked to an ocean module and a terrestrial biota module, together reflecting the carbon cycle (Goudrian and Ketner, 1987). To account for the CO_2 emissions from deforestation, a dynamic deforestation module is integrated in the biosphere component of the carbon cycle module (Swart and Rotmans, 1989). This module ties regional deforestation rates to developments in shifting and permanent agriculture, livestock keeping, commercial logging, fuelwood gathering and industrial or infrastructure projects.

The modular structure for the other trace gases is quite different from that of CO_2. The removal of the trace gases by atmospheric chemical processes is an essential feature. The concentration of methane is derived from the global CH_4-CO-OH cycle by simulating the main atmospheric chemical processes influencing the global concentrations of these trace gases. The removal rates of CH_4 and CO are determined by the uptake, transport, and oxidation rates of these trace gases, the latter being dependent on the OH- concentration (Rotmans and Eggink, 1988).

The removal rate N_2O and CFC is inversely proportional to the atmospheric lifetime. N_2O is simulated with a simple one-box module. A two-box delay model is used for CFCs, taking into account the delay between the production and emissions of different compounds (Wigley, 1988). Although CFCs other than 11 and 12 have been modelled (including HCFCs, HFCs, methylchloroform and carbon differences were generally below 10%. Better agreement was found for lower methane scenarios. However, it should be noted that IMAGE methane concentrations are rather sensitive to changes in assumptions regarding uncertain OH-concentrations.

The differences between the model results are relatively small when taking into account the extremely long simulation period. This lends credibility to the use of these kinds of models for policy evaluation purposes.

Generally RIVM agreed with the EPA-assumptions and calculations with respect to the emissions from the different sectors. Since emissions are pre- determined partly by the targets, degrees of freedom are limited. The most important variables -- improvements in energy efficiency and shifts to low- or no- carbon fuels -- are believed to be realistic and technologically feasible for all scenarios.

It should be noted that the economic growth assumptions imply more than a twenty five-fold increase in gross global product by 2100, and a tenfold global increase in average per capita GNP. Under these assumptions, the developing countries would account for approximately 50% of the world economic output by 2100, compared with their current 20% share. Not only is the feasibility of such a shift uncertain at this point, but the welfare implications for the developing countries are unclear.

In all scenarios, the detachment between economic growth and energy consumption is achieved primarily by an increase in energy efficiency over the next century. Other observations regarding the scenarios motivated RIVM to request that the analysis be extended in several important ways. First, in the three lower emission EPA scenarios (2060 Low Emissions, Control Policies, and Accelerated Policies), emission targets are reached by similar controls for the coming decades, with rather rapid emission reductions in the two lowest cases only after 2025. To reflect the concern over the timing of controls, a delayed response analysis was performed, and an Alternate Accelerated Policies scenario that

For CO_2, CH_4, and N_2O the same emission scenarios have been built in. Different estimates have been used for CFCs, however, due to the fact that EPA could only make their emission figures available while the IMAGE input requires production figures.

The results are listed in the tables and the graphs at the end of this appendix. The results of the four analyses conducted with IMAGE are discussed below.

Evaluation of the ASF Scenarios

Tables 1 through 5 list the greenhouse gas emissions for the five scenarios. Tables 6 through 10 present the concentration levels for the individual trace gases as simulated with IMAGE. Tables 11 and 12 show the equivalent-CO_2 concentrations and the equivalent temperature changes for a climate sensitivity of 3^o centigrade for a CO_2 doubling. Figures 2 to 5 compare the results of the IMAGE and ASF-calculations for CO_2, CH_4, N_2O and CO_2 equivalents. Due to differences between the models, slight discrepancies exist. Generally these are below 5% for CFCs, CO_2 , N_2O and CO_2 equivalent values up to 2050. The differences only become larger in the 2030 High Emissions scenario for the temperature change and equivalent CO_2- concentrations in the second half of the next century, up to 20% in 2100. These few discrepancies can be traced to the different relationships assumed for radiative forcing, and the different interpretation of the carbon cycle and the deforestation process used in the models. For instance, in the IMAGE deforestation scenarios, substitution between wood and fossil fuel is not taken into account directly, and reforestation is primarily effective in the coming decades, after which available land for forestation is assumed to be exhausted.

The many uncertainties in the global atmospheric chemistry of methane are not reflected by widely different outcomes. By taking OH-development similar to EPA's NO_x-emission scenarios implemented. However, controls can be relaxed slightly thereafter, since the assumed emission reductions in other greenhouse gases contribute to reaching the stabilization target. More importantly, the results imply that the longer control of emissions is delayed, the more stringent reductions would be necessary in ever shorter timeframes to reach the same goals. Because of the socio-economic, technological, and economic constraints, such rapid interventions may not be practical or even feasible, underscoring the necessity of an early response.

Alternative Accelerated Policies Scenario

At the Nairobi workshop held in June, the US-Netherlands Expert Group on Emission Scenarios was requested to develop an additional fourth scenario that would lead the CO_2 equivalent concentration to stabilize at "well below" the doubling level. Present CO_2-equivalent concentrations are about 35% above pre-industrial levels. The expert group agreed on the final level (about 160% of pre-industrial concentrations), but did not reach a compromise on the timing of the necessary controls on fossil fuel CO_2 emissions. EPA devoted much attention to the presently assessed feasibility of the scenario, primarily with respect to the technological options. A case was developed that satisfies the "well below stabilization" criterion of the IPCC. The global fossil fuel CO_2-emissions in this scenario are allowed to increase slightly over the next decades, but are reduced drastically after 2025 to reach the 160% concentration target. RIVM developed an alternative case reflecting the reason of the request for an additional scenario, i.e. the need to slow down climate change as soon as possible. Consequently, an earlier reduction of fossil CO_2 emissions was simulated with IMAGE. In this case emissions gradually decrease to about 50% of the 1985 value by 2100, and led to approximately the same level as in the EPA scenario. This scenario would lead equilibrium temperature changes to slow down to values below 0.1 degree per decade (based on a 3 degree climate sensitivity for CO_2-doubling) considerably earlier than in the EPA-simulation.

emphasizes earlier response was developed. Second, the EPA assessment of the potential for controlling methane, nitrous oxide, carbon monoxide, and deforestation in the lower emission scenarios was considered rather optimistic as compared to the fossil fuel CO_2-emissions. Therefore an additional sensitivity analysis was performed with higher methane, carbon monoxide, and nitrous oxide emissions.

Delayed Response Analysis

In the delayed response analysis, the 2030 High Emission scenario is taken as a reference, i.e. emissions follow this pathway if no international action is taken to control greenhouse gases. An equivalent CO_2 doubling in 2090 (the Control Policies scenario) is chosen as the policy goal for both fossil fuel CO_2 emissions and other greenhouse gases. It should be noted that for the coming decades, the controls in the 2060 High Emissions and the EPA Accelerated Policies Scenarios do not differ much from the Control Policies scenario

The results of the Control Policies scenario suggest that a stabilization of global fossil CO_2-emissions would be necessary to achieve the 2090 equivalent CO_2-doubling target, and assume that some controls would begin immediately. In the first delayed response run, it is assumed that such initiatives would be delayed because of negotiating difficulties and insufficient unilateral or bilateral action, but that effective control would take place from 2000 onwards. In subsequent runs, the CO_2 controls are assumed to start in 2010, 2020 and 2030, respectively. Holding the emissions of other greenhouse gases at Control Policies scenario levels, a fossil CO_2-emission pathway was determined which would lead to the desired stabilization at double pre-industrial levels in 2090 (this required a trial and error procedure). The required CO_2 emission levels are listed in Table 13 and shown on Figure 6, and the resulting concentrations are listed in Table 14 and shown on Figure 7.

Because of the delay, emissions would have to be cut back drastically when controls are finally

It should also be noted that 1975 is the base year of the Edmonds-Reilly model. Because of historic growth of emissions in the years since 1975, the calculated emission levels for 2000 for the developing countries appear to be unrealistically low, implying that emissions in the industrialized countries should even be curtailed more in the short term in order to achieve the target. For example, an emission rate of 4.8 Gt/yr in 2000 could be achieved by a 20% reduction in OECD-countries, a 10% decrease in Eastern European countries, and a 10% increase in the developing countries as compared with 1985 emissions. The EPA Accelerated Policies scenario (5.6 Gt/yr in 2000) requires a 6% reduction in OECD countries, and allows a 4% increase in Eastern Europe and a 28% increase in developing countries.

Finally, both the ASF and IMAGE carbon cycle models optimistically suggest that CO_2 concentrations could be stabilized at low levels by reducing the global emissions by half, implying that oceanic and biospheric sinks could remove the other half from the atmosphere. Evidently this observation is subject to further debate. Although the difference in temperature forcing between the two cases in numerical terms is limited to about 3% and 6% in 2000 and 2025 respectively, the cases do represent different perspectives.

Less Optimistic CH_4 and N_2O Assumptions

The difficulties for the low scenarios described above are compounded by the importance of emission controls for greenhouse gases other than CO_2 and CFCs. The assumptions used for methane reflect the belief that methane emissions can be slowed down immediately and can be reduced after 2025, while global CO-emissions would be decreased immediately. This would lead to a stabilization of methane concentrations around 2025 and decreasing concentrations thereafter. On the one hand, this demonstrates the potential effectiveness of short-term methane controls given the relatively short atmospheric lifetime. On the other hand, the assumed controls may be too optimistic, taking into

In theory, the RIVM Alternative Accelerated Policies emission levels could be achieved technologically and would allow for a more gradual shift to a low-CO_2 energy system. This would stress the responsibilities of the present generation to start controlling greenhouse gas emissions, but would require considerably more political will. International negotiations and agreements are likely to create the now-absent incentive for the development of energy efficient and non-fossil technologies, and for structural economic and behavioral changes.

Although the main objective of this alternate scenario is not to demonstrate its feasibility, output data from an analysis with the Edmonds-Reilly model using an economic growth scenario similar to the EPA high growth case has been included in this Appendix. The low CO_2 emissions in this run are achieved primarily by a combination of energy efficiency increases, decreasing prices of renewables as a result of intensified research and development (notably solar energy), and taxes on both the supply and end-use of fossil fuels. With a per capita economic growth of more than 2% in the coming decades global energy efficiency should be increased by 2% annually, in addition to a 1% annual shift to lower carbon fuels. This latter shift is achieved in the example primarily by a replacement of coal as a solid fuel by renewable biomass and by satisfying marginal additional demands with other renewables and, to a lesser extent, nuclear energy.

The feasibility and costs of these changes can be evaluated only with detailed bottom-up country analyses. It is interesting to note that in the 2060 Low Emissions, Control Policies, and EPA Accelerated Policies scenarios a 2% annual efficiency increase is also necessary, but the shift to low-carbon fuels takes place later. Generally the efficiency increases are assumed to be higher in the industrialized countries (approximately 3% annually) than in the developing countries (approximately 1.5% annually). Evidently, for lower economic growth these percentages are lower. Other end-use oriented studies confirm the technological feasibility of such a low scenario.

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account the remaining uncertainties with regard to the sources of CH_4 and CO. The same applies to N_2O, where emission growth is also assumed to be slowed within the coming years and emissions decreased after 2025. However, the long atmospheric lifetime of nitrous oxide makes the effect less pronounced than in the case of methane. Finally, deforestation is assumed to be reversed in 2000, a development that will have to be reconciled with the necessary increases in output of agriculture and forestry in the developing countries.

Although all these assumptions may be valid, the uncertainties involved make it worthwhile to evaluate their importance relative to CO_2. For example, the efficiency of fertilizer use might not increase as fast as assumed, and thus not limit nitrous oxide emissions. The same applies to the methane emissions from rice paddies, waste, cattle, and mining, as well as the deforestation process driven by agricultural and economic expansion. The CO_2-emissions from fossil fuel combustion would have to be reduced more and earlier, if reality proves the assumptions to be too optimistic. To evaluate this, somewhat higher emission estimates were used for methane and nitrous oxide, which we believe are still optimistic. Then we developed a CO_2-pathway that would lead to stabilization at the same equivalent concentrations (160% of pre-industrial values). In this case, the CO_2 emissions from fossil fuels would have to be halved before 2025 -- rather than in the second half of the next century -- and decreased further thereafter (Tables 15 - 16, Figure 8). In summary, if the emission controls for methane, carbon monoxide and nitrous oxide prove to be unrealistic, the controls on CO_2-emissions will have to be much more stringent to reach the same objectives in terms of CO_2-equivalent concentrations.

Table 3: Emissions of trace gases for the Control Policies Scenario

Trace gas \ Time		1985	2000	2025	2050	2075	2100
CO_2	(GtC)	5.40	6.04	6.74	7.40	5.28	3.69
N_2O	(Tg)	12.5	12.9	13.2	12.0	12.5	12.2
CH_4	(Tg)	540	558	608	622	562	505
CO	(Tg)	2493	2300	2128	2054	2024	1983
CFC-11	(Gg)	278	197	11	0	0	0
CFC-12	(Gg)	362	262	10	0	0	0
HCFC-22	(Gg)	140	639	1572	2928	3209	3209
CFC-113	(Gg)	151	30	0	0	0	0
CFC-114	(Gg)	14.6	5.3	0	0	0	0
CFC-115	(Gg)	4.7	6.3	0	0	0	0
CCl_4	(Gg)	87	110	110	110	110	110
CH_3CCl_3	(Gg)	814	664	664	664	664	664

Table 4: Emissions of trace gases for the EPA Accelerated Policies Scenario

Trace gas \ Time		1985	2000	2025	2050	2075	2100
CO_2	(GtC)	5.40	6.13	5.55	3.23	3.12	2.91
N_2O	(Tg)	12.5	12.9	13.1	12.7	12.5	12.3
CH_4	(Tg)	541	566	583	553	530	502
CO	(Tg)	2493	2276	2131	2032	2004	1981
CFC-11	(Gg)	278	197	11	0	0	0
CFC-12	(Gg)	362	262	10	0	0	0
HCFC-22	(Gg)	140	639	1572	2928	3209	3209
CFC-113	(Gg)	151	30	0	0	0	0
CFC-114	(Gg)	14.6	5.3	0	0	0	0
CFC-115	(Gg)	4.7	6.3	0	0	0	0
CCl_4	(Gg)	87	110	110	110	110	110
CH_3CCl_3	(Gg)	814	664	664	664	664	664

Table 1: Emissions of trace gases for the 2030 High Emission Scenario

Trace gas \ Time		1985	2000	2025	2050	2075	2100
CO_2	(GtC)	5.40	7.60	10.17	13.81	17.99	22.01
N_2O	(Tg)	12.5	14.2	16.4	17.3	17.3	17.6
CH_4	(Tg)	540	614	761	899	992	1063
CO	(Tg)	2493	2675	3267	3695	3748	4046
CFC-11	(Gg)	278	305	245	252	253	253
CFC-12	(Gg)	362	376	303	314	316	316
HCFC-22	(Gg)	140	523	1340	2681	2961	2961
CFC-113	(Gg)	151	133	122	125	125	125
CFC-114	(Gg)	14.6	10.6	8.7	9.1	9.1	9.1
CFC-115	(Gg)	4.7	7.0	4.7	4.8	4.9	4.9
CCl_4	(Gg)	87	162	300	557	557	557
CH_3CCl_3	(Gg)	814	1123	1841	3413	3413	3413

Table 2: Emissions of trace gases for 2060 Low Emission Scenario

Trace gas \ Time		1985	2000	2025	2050	2075	2100
CO_2	(GtC)	5.40	5.98	6.83	7.82	8.94	10.50
N_2O	(Tg)	12.5	13.1	13.9	14.1	14.4	14.6
CH_4	(Tg)	540	577	665	724	732	736
CO	(Tg)	2493	2316	2212	2172	2194	2220
CFC-11	(Gg)	278	302	227	223	223	223
CFC-12	(Gg)	362	372	279	278	278	278
HCFC-22	(Gg)	140	526	1357	2707	2988	2988
CFC-113	(Gg)	151	131	117	117	117	117
CFC-114	(Gg)	14.6	10.5	8.1	8.1	8.1	8.1
CFC-115	(Gg)	4.7	7.0	4.4	4.4	4.4	4.4
CCl_4	(Gg)	87	162	300	557	557	557
CH_3CCl_3	(Gg)	814	993	1841	3413	3413	3413

Table 5: Emissions of trace gasses for the RIVM Alternative Accelerated Policies Scenario

Trace gas \ Time		1985	2000	2025	2050	2075	2100
CO_2	(GtC)	5.40	4.76	4.20	3.88	3.46	2.70
N_2O	(Tg)	12.5	12.9	13.1	12.7	12.5	12.3
CH_4	(Tg)	541	566	583	553	530	502
CO	(Tg)	2493	2276	2131	2032	2004	1981
CFC-11	(Gg)	278	197	10	0	0	0
CFC-12	(Gg)	362	262	10	0	0	0
HCFC-22	(Gg)	140	639	1572	2928	3209	3209
CFC-113	(Gg)	151	30	0	0	0	0
CFC-114	(Gg)	14.6	5.3	0	0	0	0
CFC-115	(Gg)	4.7	6.3	0	0	0	0
CCl_4	(Gg)	87	110	110	110	110	110
CH_3CCl_3	(Gg)	814	664	664	664	664	664

Table 6: Concentrations of trace gases for the 2030 High Emission Scenario

Trace gas \ Time		1985	2000	2025	2050	2075	2100
CO_2	(ppm)	345.0	382.0	451.2	531.0	635.3	760.7
N_2O	(ppb)	311	323.1	348.9	378.0	405.2	429.0
CH_4	(ppb)	1735.7	2131.1	2819.3	3339.2	3680.7	3919.1
CFC-11	(ppt)	220.0	369.8	497.5	561.4	607.2	639.6
CFC-12	(ppt)	375.0	615.7	884.5	1083.1	1254.7	1399.9
HCFC-22	(ppt)	39.0	151.9	699.9	1708.6	2546.9	2925.5
CFC-113	(ppt)	33.7	97.7	156.2	202.3	239.3	268.1
CFC-114	(ppt)	5.0	7.7	10.6	13.0	15.0	16.7
CFC-115	(ppt)	4.0	6.7	11.4	15.5	19.3	22.8
CCl_4	(ppt)	111.6	148.0	266.8	500.0	736.5	879.2
CH_3CCl_3	(ppt)	152.1	239.2	447.8	849.0	958.4	959.9

Table 7: Concentrations of trace gases for the 2060 Low Emission Scenario

Trace gas \ Time	1985	2000	2025	2050	2075	2100
CO_2 (ppm)	345.0	376.6	422.6	464.3	508.9	568.4
N_2O (ppb)	311.8	321.5	339.0	356.2	372.1	386.9
CH_4 (ppb)	1735.7	1902.8	2057.7	2268.4	2392.2	2389.0
CFC-11 (ppt)	220.0	369.1	485.5	530.9	557.3	573.9
CFC-12 (ppt)	375.0	614.9	866.5	1033.5	1169.0	1280.5
HCFC-22 (ppt)	39.0	151.2	707.8	1680.0	2553.8	2946.9
CFC-113 (ppt)	33.7	97.7	153.7	196.1	229.2	254.9
CFC-114 (ppt)	5.0	7.7	10.5	12.7	14.4	15.9
CFC-115 (ppt)	4.0	6.7	11.3	15.3	18.9	22.1
CCl_4 (ppt)	111.6	148.0	266.8	500.0	736.5	879.2
CH_3CCl_3 (ppt)	152.1	239.2	447.8	849.0	958.4	959.9

Table 8 Concentrations of trace gases for the Control Policies Scenario

Trace gas \ Time	1985	2000	2025	2050	2075	2100
CO_2 (ppm)	345.0	373.8	413.9	450.5	478.1	489.8
N_2O (ppb)	311.8	321.2	336.8	350.5	360.5	367.1
CH_4 (ppb)	1735.7	1879.8	2008.2	2142.9	1977.5	1573.1
CFC-11 (ppt)	220.0	345.9	300.8	204.9	136.8	91.3
CFC-12 (ppt)	375.0	588.2	592.4	498.2	414.7	345.1
HCFC-22 (ppt)	39.0	160.6	834.1	1874.8	2773.7	3174.6
CFC-113 (ppt)	33.7	92.1	79.7	63.6	50.1	39.1
CFC-114 (ppt)	5.0	7.6	8.8	8.9	8.5	8.0
CFC-115 (ppt)	4.0	6.7	10.6	12.7	13.5	13.7
CCl_4 (ppt)	111.6	135.9	167.9	187.2	198.9	205.9
CH_3CCl_3 (ppt)	152.1	185.0	186.7	186.8	186.8	186.8

Table 9: Concentrations of trace gases for the EPA Acclerated Policies Scenario

Trace gas \ Time	1985	2000	2025	2050	2075	2100
CO_2 (ppm)	345.0	371.9	399.1	406.5	421.6	421.0
N_2O (ppb)	311.8	321.2	339.6	349.2	358.6	365.5
CH_4 (ppb)	1735.7	1877.7	1924.2	1819.9	1608.6	1406.6
CFC-11 (ppt)	220.0	345.9	300.8	204.8	136.6	91.0
CFC-12 (ppt)	375.0	588.2	592.4	498.1	414.4	344.7
HCFC-22 (ppt)	39.0	160.6	834.1	1874.8	2773.7	3174.6
CFC-113 (ppt)	33.7	92.1	79.7	63.6	50.1	39.1
CFC-114 (ppt)	5.0	7.6	8.8	8.9	8.5	8.0
CFC-115 (ppt)	4.0	6.7	10.6	12.7	13.5	13.7
CCl_4 (ppt)	111.6	135.9	167.9	187.2	198.9	205.9
CH_3CCl_3 (ppt)	152.1	185.0	186.7	186.8	186.8	186.8

Table 10: Concentrations of trace gases for the RIVM ALternative Accelerated Policies Scenario

Trace gas \ Time	1985	2000	2025	2050	2075	2100
CO_2 (ppm)	345.0	368.5	386.9	395.4	407.5	416.0
N_2O (ppb)	311.8	321.2	339.6	349.2	358.6	365.5
CH_4 (ppb)	1735.7	1877.7	1924.2	1819.9	1608.6	1406.6
CFC-11 (ppt)	220.0	345.9	300.8	204.8	136.6	91.0
CFC-12 (ppt)	375.0	588.2	592.4	498.1	414.4	344.7
HCFC-22 (ppt)	39.0	160.6	834.1	1874.8	2773.7	3174.6
CFC-113 (ppt)	33.7	92.1	79.7	63.6	50.1	39.1
CFC-114 (ppt)	5.0	7.6	8.8	8.9	8.5	8.0
CFC-115 (ppt)	4.0	6.7	10.6	12.7	13.5	13.7
CCl_4 (ppt)	111.6	135.9	167.9	187.2	198.9	205.9
CH_3CCl_3 (ppt)	152.1	185.0	186.7	186.8	186.8	186.8

Table 11: Equivalent CO_2-concentrations for all scenarios (ppm)

Equiv.Conc. \ Time	1985	2000	2025	2050	2075	2100
Eq. CO_2- conc. for 2030 High Emission scenario	387.6	446.4	553.5	671.6	820.0	996.7
Eq. CO_2- conc. for 2060 Low Emission scenario	387.6	425.9	486.8	546.0	606.8	682.0
Eq. CO_2- conc. for Control Pol. scenario	387.6	422.0	474.8	524.2	552.7	553.2
Eq. CO_2- conc. for EPA Accelerated Pol. scenario	387.6	419.8	455.2	462.8	465.2	469.4
Eq. CO_2- conc. for RIVM Accelerated Pol. scenario	387.6	416.0	441.3	450.3	459.5	463.9

Table 12 Equivalent temperature increase for all scenarios (C°) (climate sensitivity 3° C at $2xCO_2$)

Temp. rise \ Time	1985	2000	2025	2050	2075	2100
eq. temp. increase for 2030 High Emissions scenario	1.41	2.02	2.95	3.79	4.65	5.50
eq. temp. increase for 2060 Low Emission scenario	1.41	1.82	2.39	2.89	3.35	3.85
eq. temp. increase for Control Pol. scenario	1.41	1.78	2.29	2.71	2.94	2.95
eq. temp. increase for EPA Accelerated Policies scenario	1.41	1.75	2.10	2.18	2.20	2.24
eq. temp. increase for RIVM Accelerated Policies scenario	1.41	1.71	1.97	2.06	2.14	2.19

Table 13: CO_2-emissions for the different delayed response strategies

Response strat.\Time	1985	2000	2025	2050	2075	2100
CO_2-emission (GtC) for a 2000 response	5.40	6.62	5.75	5.50	5.75	5.75
CO_2-emission (GtC) for a 2010 response	5.40	6.62	5.50	5.25	5.25	5.25
CO_2-emission (GtC) for a 2020 response	5.40	6.62	7.00	2.75	4.00	6.00
CO_2-emission (GtC) for a 2030 response	5.40	6.62	10.17	0.00	2.50	4.00

Table 14: CO_2 and CO_2-equivalent concentrations for the different delayed response strategies

Response strat.\Time	1985	2000	2025	2050	2075	2100
Equivalent CO_2-conc.(ppm) for a 2000 response	387.6	434.8	517.1	550.2	557.4	569.9
Equivalent CO_2-conc.(ppm) for a 2010 response	387.6	434.8	517.3	551.6	558.0	569.2
Equivalent CO_2-conc.(ppm) for a 2020 response	387.6	434.8	537.9	566.4	563.6	554.3
Equivalent CO_2-conc.(ppm) for a 2030 response	387.6	434.8	541.4	573.8	572.4	560.2
CO_2-conc.(ppm) for a 2000 response	347.8	378.1	422.5	448.3	471.9	501.5
CO_2-conc.(ppm) for a 2010 response	347.8	378.1	427.8	451.9	471.7	497.3
CO_2-conc.(ppm) for a 2020 response	347.8	380.1	444.8	450.4	456.1	470.6
CO_2-conc.(ppm) for a 2030 response	347.8	380.1	447.7	456.3	442.8	446.0

Table 15: Emissions for high methane/nitrous oxide analysis

Trace gas \ Time	1985	2000	2025	2050	2075	2100
CO_2 (GtC)	5.40	4.32	2.70	2.25	2.25	2.25
N_2O (Tg)	12.5	14.2	16.4	17.3	17.3	17.6
CH_4 (Tg)	540	614	761	899	992	1063
CO (Tg)	2447	2529	2764	2969	3106	3217

Table 16: Concentrations for high methane/nitrous oxide analysis

Trace gas \ Time	1985	2000	2025	2050	2075	2100
CO_2 (ppm)	347.8	367.3	377.9	376.4	381.8	389.0
N_2O (ppb)	307.4	322.7	354.0	389.2	426.1	460.4
CH_4 (ppb)	1724	1908	2117	2183	2079	1852
CO_2-eq (ppm)	386.1	415.7	439.7	446.7	457.3	465.8

Figure 1: IMAGE Integrated Model for the Assessment of the Greenhouse Effect

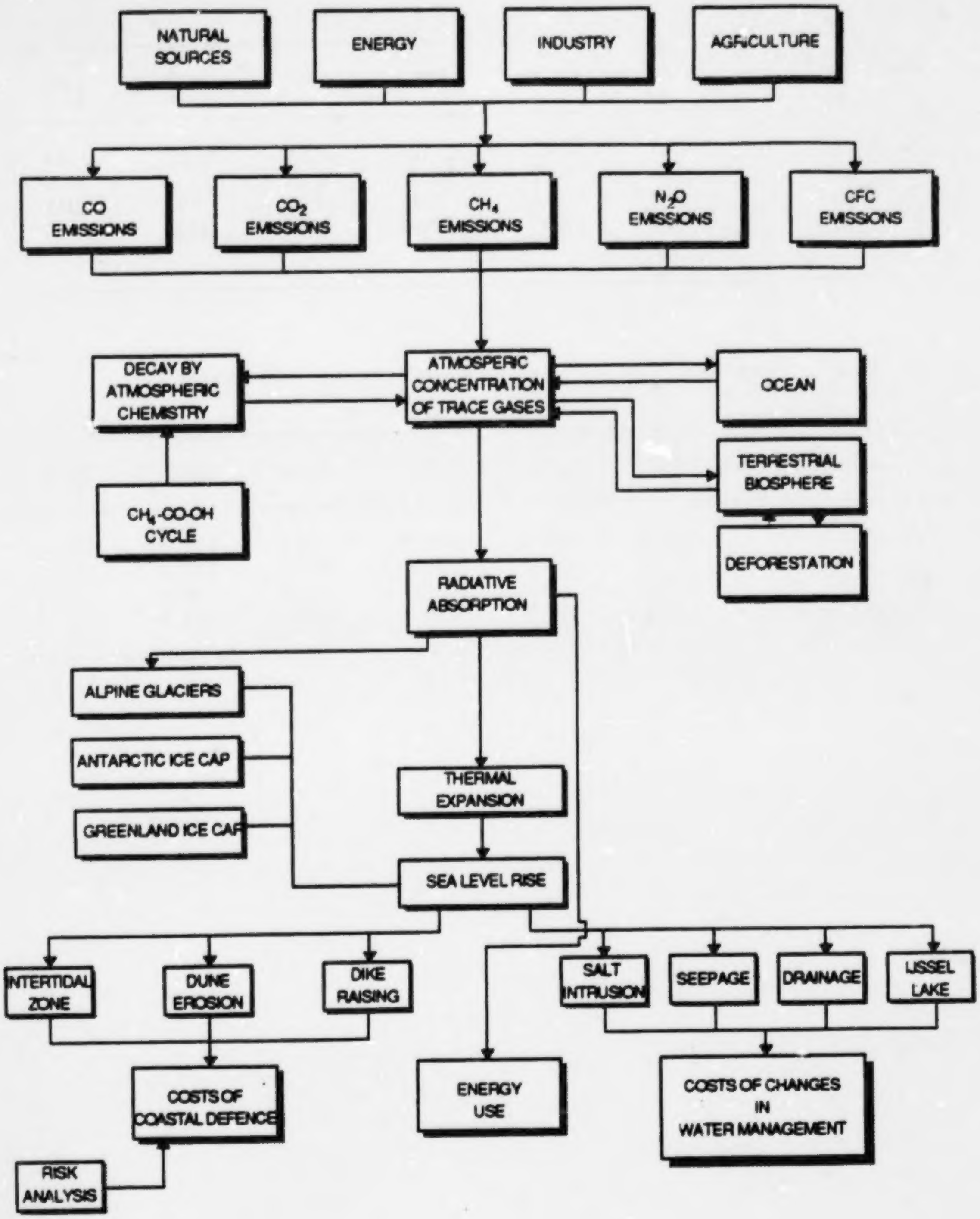
NATURAL SOURCES
ENERGY
INDUSTRY
AGRICULTURE
CO EMISSIONS
CO_2 EMISSIONS
CH_4 EMISSIONS
N_2O EMISSIONS
CFC EMISSIONS
DECAY BY ATMOSPHERIC CHEMISTRY
ATMOSPERIC CONCENTRATION OF TRACE GASES
OCEAN
TERRESTRIAL BIOSPHERE
DEFORESTATION
CH_4-CO-OH CYCLE
RADIATIVE ABSORPTION
ALPINE GLACIERS
ANTARCTIC ICE CAP
GREENLAND ICE CAP
THERMAL EXPANSION
SEA LEVEL RISE
INTERTIDAL ZONE
DUNE EROSION
DIKE RAISING
SALT INTRUSION
SEEPAGE
DRAINAGE
IJSSEL LAKE
COSTS OF COASTAL DEFENCE
ENERGY USE
COSTS OF CHANGES IN WATER MANAGEMENT
RISK ANALYSIS

Figure 2a: CO_2 concentrations evaluation ASF-scenarios

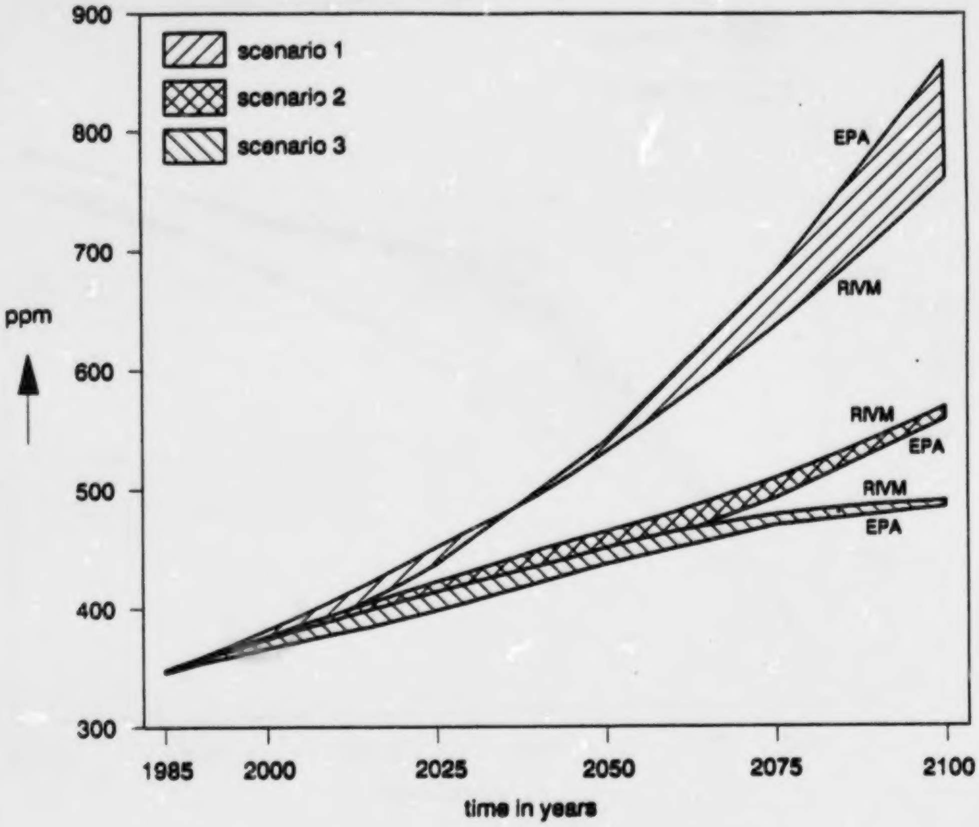

Figure 2a: Comparison simulation results CO_2-concentrations

Scenario 1: 2030 High Emissions
Scenario 2: 2060 Low Emissions
Scenario 3: Control Policies

Figure 2b: CO_2 concentrations evaluation ASF-scenarios

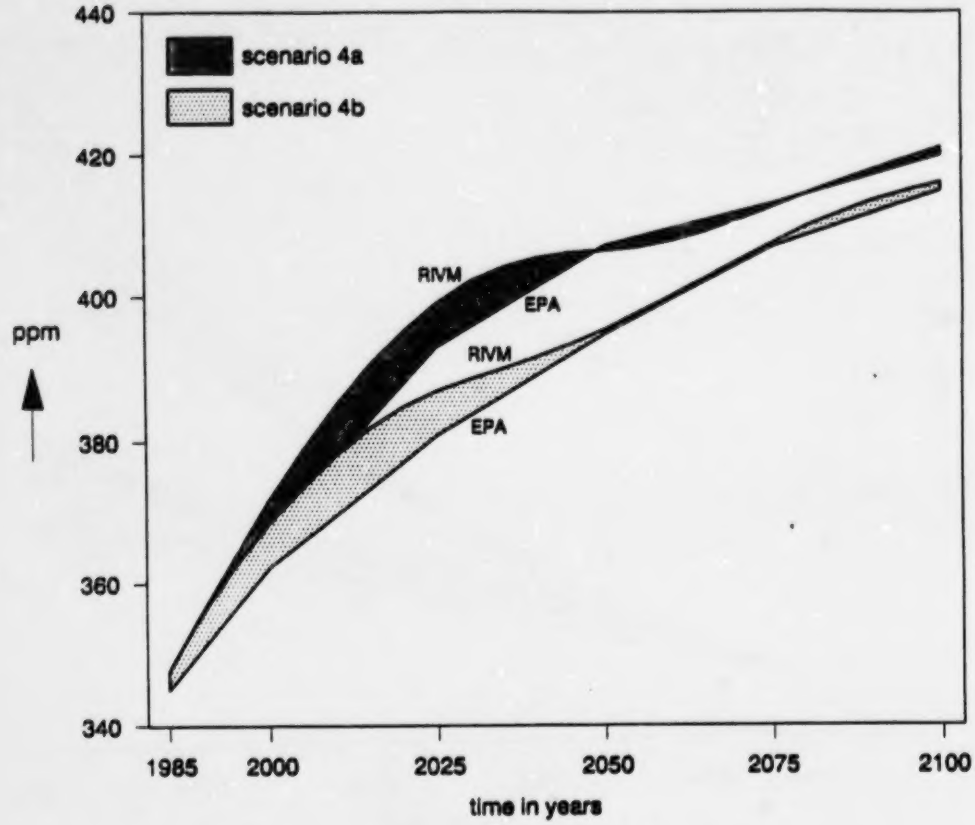

Figure 2b: Comparison simulation results CO_2-concentrations

Scenario 4a: EPA Accelerated Policies Scenario
Scenario 4b: RIVM Alternative Accelerated Policies Scenario

Figure 3: CH_4 concentrations evaluation ASF-scenarios

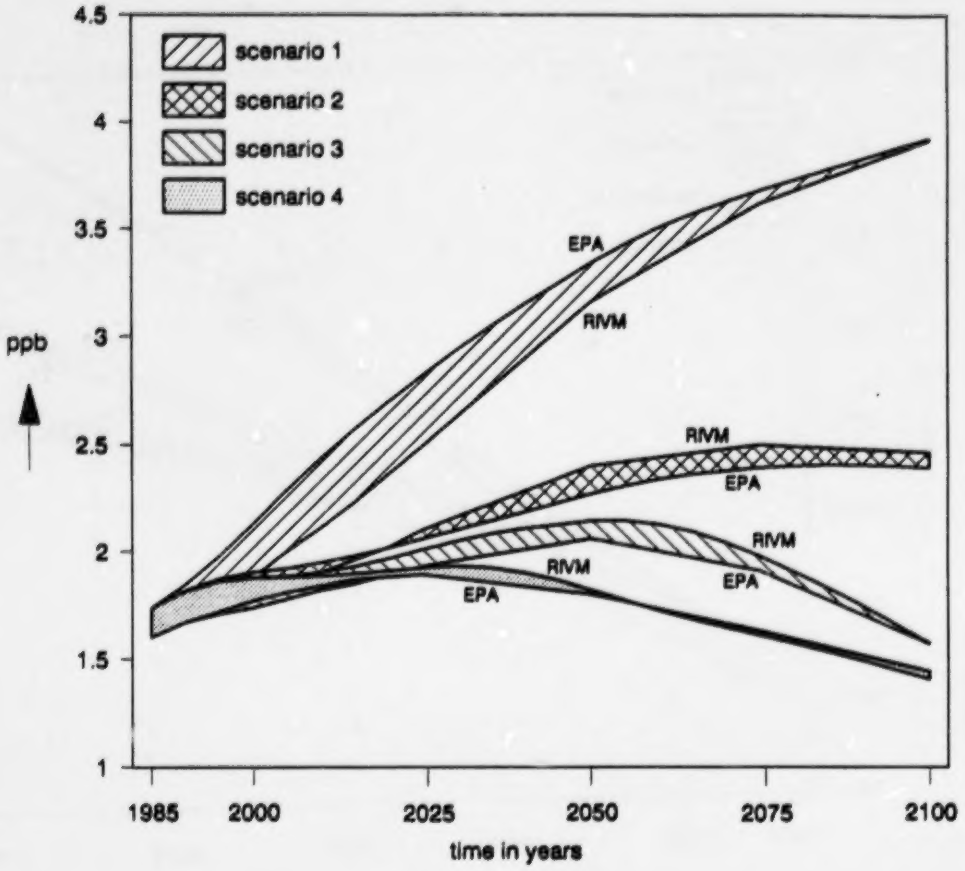

figure 3: Comparison simulation results CH_4-concentrations

Scenario 1: 2030 High Emissions
Scenario 2: 2060 Low Emissions
Scenario 3: Control Policies
Scenario 4: Accelerated Policies Scenario

Figure 4: N_2O concentrations evaluation ASF-scenarios

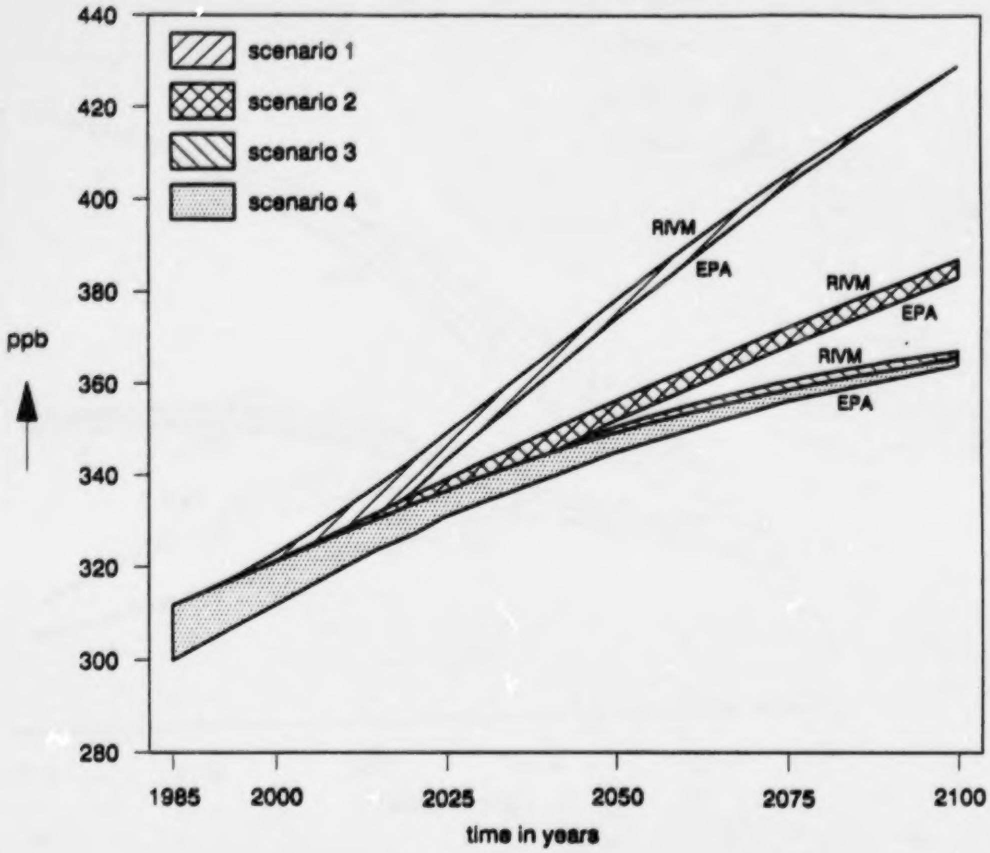

Figure 4: Comparison simulation results N_2O-concentrations

Scenario 1: 2030 High Emissions
Scenario 2: 2060 Low Emissions
Scenario 3: Control Policies
Scenario 4: Accelerated Policies Scenario

Figure 5a: equivalent CO_2 concentrations evaluation ASF-scenarios

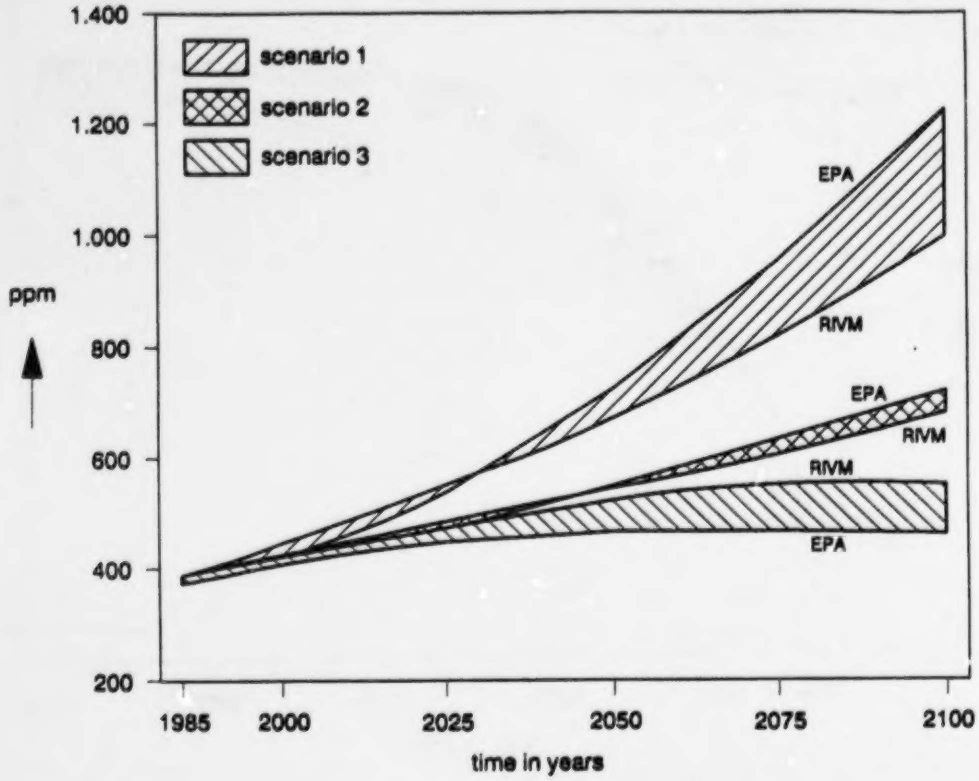

Figure 5a: Comparison simulation results equivalent CO_2-concentrations

Scenario 1: 2030 High Emissions
Scenario 2: 2060 Low Emissions
Scenario 3: Control Policies

Figure 5b: equivalent CO_2 concentrations evaluation ASF-scenarios

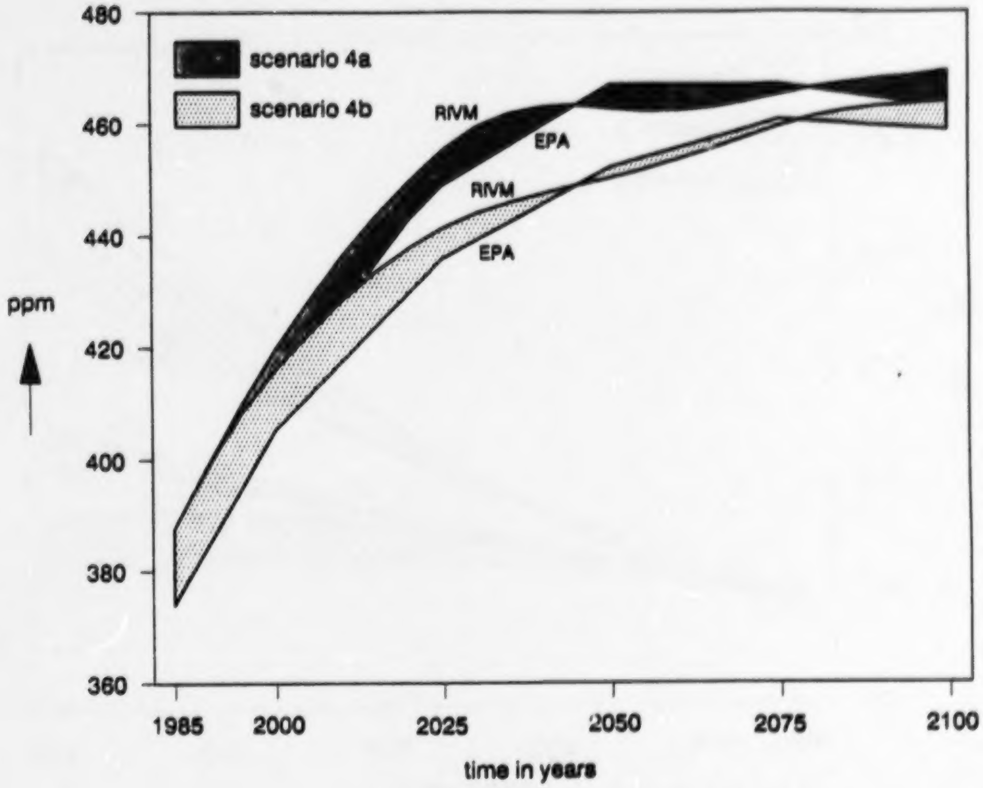

Figure 5b: Comparison simulation results equivalent CO_2-concentrations

Scenario 4a: EPA Accelerated Policies Scenario
Scenario 4b: RIVM Alternative Accelerated Policies Scenario

Figure 6: tolerable CO_2 emissions delayed response analysis

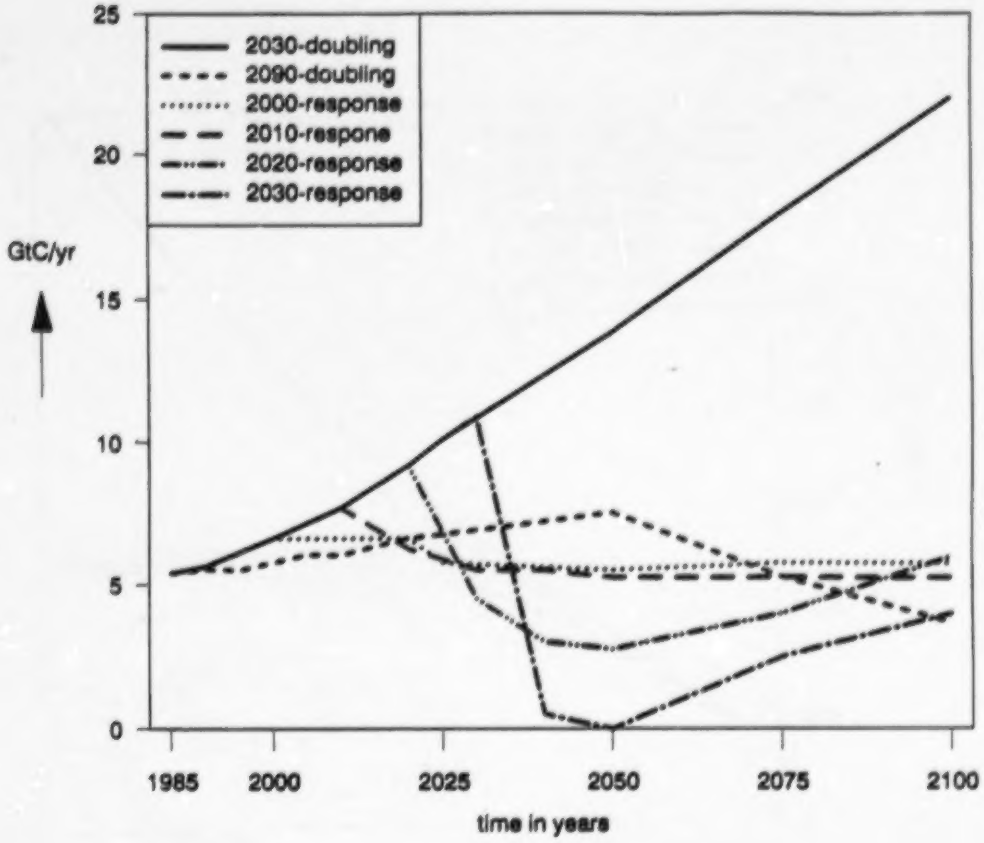

Figure 6: Fossil fuel CO_2-emission for delayed response analysis

———: 2030 High Emissions Scenario
------: Control Policies Scenario

Figure 7: CO_2 equivalent concentrations delayed response analysis

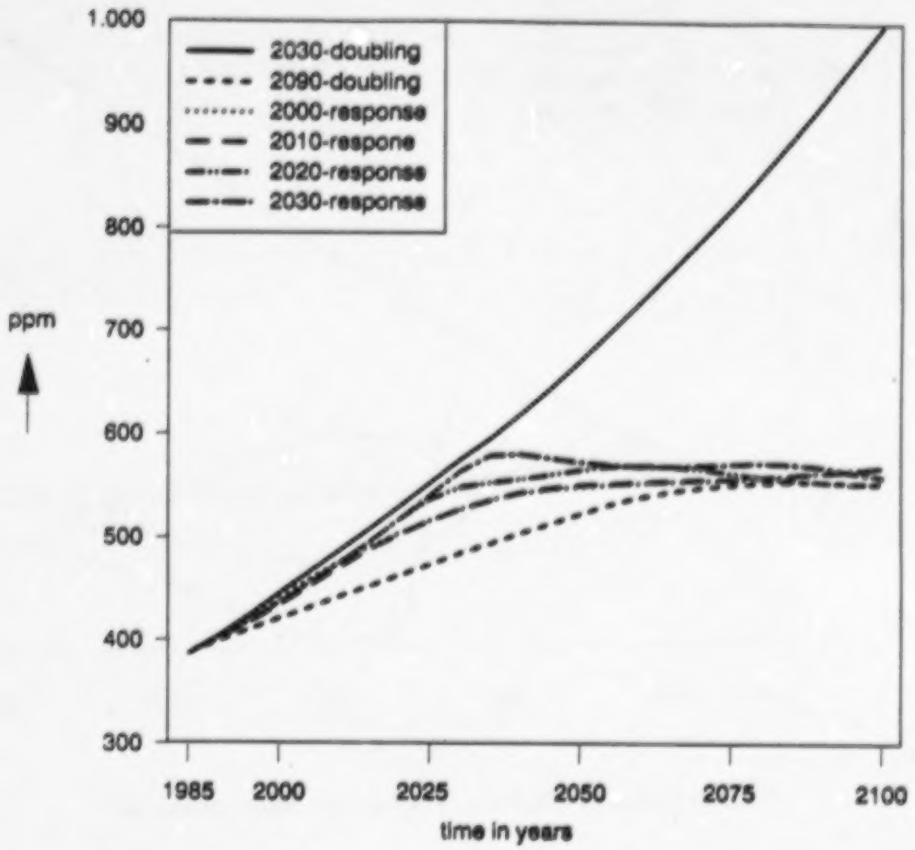

Figure 7: Equivalent CO_2-concentrations for delayed response analysis

———: 2030 High Emissions Scenario
------: Control Policies Scenario

Figure 8: High CH_4 / N_2O case

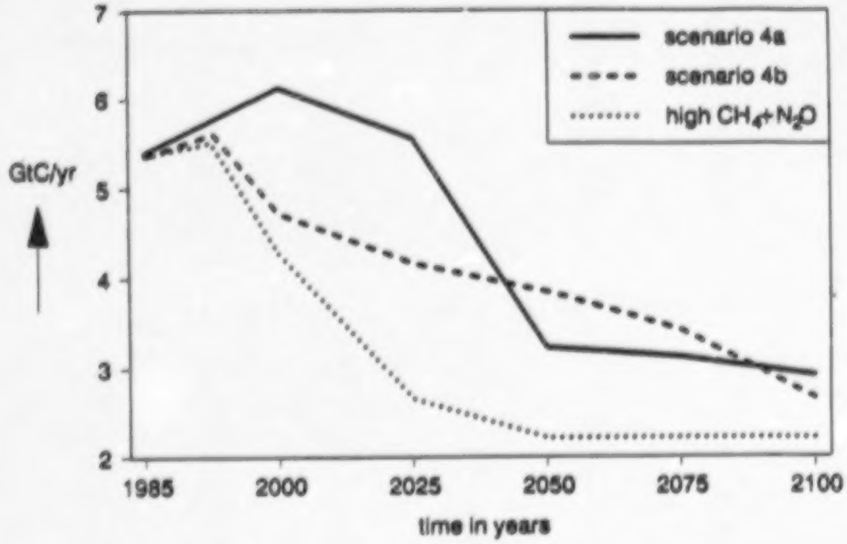

Fig. 8: Fossil fuel CO_2 emissions for high CH_4 + N_2O case

Scenario 4a: EPA Accelerated Policies Scenario
Scenario 4b: RIVM Alternative Accelerated Policies Scenario

ANNEX TO RIVM APPENDIX TO IPCC EMISSIONS SCENARIOS REPORT
LOW CO2-RUN DD 6/12/89 FOR IPCC
ACCELERATED POLICIES SCENARIO
(EDMONDS AND REILLY MODEL VERSION A84PC)

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                          2000 ENERGY PRODUCTION AND USAGE REPORT
                          ***************************************

                 PRIMARY ENERGY DEMAND SUMMARY, BY REGION AND TYPE
                            (UNITS-EXAJOULES (J*10**18))
                    OIL      GAS     SOLIDS   NUCLEAR   SOLAR    HYDRO    TOTAL
                 -------- -------- -------- -------- -------- -------- --------
 USA               27.88    12.73    23.00     7.64      .31     5.49    77.05
 CANADA & EUR      22.92     9.32    10.02     6.20      .08    10.96    59.50
 OECD PACIFIC      15.39     2.89     6.38     1.75      .04     2.38    28.83
 USSR/E. EUR.      36.54    16.10    25.04     1.63      .03    10.17    89.51
 CHINA/ET.AL.      11.02     1.11    17.95      .18      .00     5.54    35.81
 MIDDLE EAST        5.00      .71      .07      .00      .00     1.23     7.01
 AFRICA             3.51      .79     1.86      .00      .00     1.32     7.48
 LATIN AMER        11.34     2.54      .97      .06      .00    11.00    25.92
 S.&E. ASIA        10.95      .96     6.27      .39      .02     6.23    24.82
                 -------- -------- -------- -------- -------- -------- --------
 ALL REGIONS      144.53    47.15    91.56    17.86      .48    54.33   355.91

                 PRIMARY ENERGY SUPPLY SUMMARY, BY REGION AND TYPE
                            (UNITS-EXAJOULES (J*10**18))
                    OIL      GAS     SOLIDS   NUCLEAR   SOLAR    HYDRO    TOTAL
                 -------- -------- -------- -------- -------- -------- --------
 USA                 .00     1.61    20.11     7.64      .31     5.49    35.17
 CANADA & EUR      17.98     5.16     7.55     6.20      .08    10.96    47.94
 OECD PACIFIC        .00     1.18     6.71     1.75      .04     2.38    12.06
 USSR/E. EUR.      21.64    29.20    37.81     1.63      .03    10.17   100.49
 CHINA/ET.AL.       9.75      .68     6.16      .18      .00     5.54    22.32
 MIDDLE EAST       42.76     1.70      .49      .00      .00     1.23    46.17
 AFRICA            26.97      .44     3.02      .00      .00     1.32    31.75
 LATIN AMER        23.19     4.11     3.98      .06      .00    11.00    42.35
 S.&E. ASIA         2.25     3.06     5.38      .39      .02     6.23    17.33
                 -------- -------- -------- -------- -------- -------- --------
 ALL REGIONS      144.53    47.15    91.21    17.86      .48    54.33   355.57
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                 2000 ENERGY USE PER DOLLAR GNP AND PER CAPITA
                 *********************************************

   REGION      POPUL.  BASE GNP FINAL GNP ENERGY USE   E/GNP    E/CAPITA   GNP/CAP
               (MIL)  (BIL 1988 US DOL) (EXAJOULES) J*10**9/$ J*10**9/CAP  $/CAP
 ----------- ------- ---------------- ---------- --------- ----------- -------
 USA            267.    6674.    6588.     77.05      11.70     288.58   24676.
 CANADA & EUR   459.    8450.    8370.     59.50       7.11     129.62   18238.
 OECD PACIFIC   144.    2496.    2478.     28.83      11.64     200.19   17206.
 USSR/E. EUR.   454.    5586.    5298.     89.51      16.90     197.15   11668.
 CHINA/ET.AL.  1408.    2184.    2036.     35.81      17.60      25.43    1446.
 MIDDLE EAST    171.     942.     960.      7.01       7.30      40.98    5612.
 AFRICA         872.     912.     888.      7.48       8.43       8.58    1018.
 LATIN AMER     530.    2156.    2050.     25.92      12.65      48.90    3866.
 S.&E. ASIA    1858.    1778.    1686.     24.82      14.71      13.36     908.
 ----------- ------- ---------------- ---------- --------- ----------- -------
 ALL REGIONS   6163.   31186.   30352.    355.91      11.73      57.75    2462.
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                      2000 CO2 EMISSIONS REPORT
                      *************************
               CO2 EMISSIONS BY REGION AND PRIMARY ENERGY SOURCE
                      UNITS:  10**6 TONNES OF CARBON
                  CONSUMPTION                           PRODUCTION
  REGION          OIL    GAS   COAL  SYNOIL  SYNGAS  SHALE BIOMASS FLARING  TOTAL
  ----------    ------ ------ ------ ------  ------  ------ ------ ------  ------
  USA            525.   171.   545.     0.      0.      0.   -50.     0.   1191.
  W EUR + CAN    419.   125.   237.     0.      0.      0.  -150.     1.    632.
  OECD PACIFIC   275.    39.   151.     0.      0.      0.   -25.     0.    441.
  USSR/E. EUR.   655.   216.   593.     1.      0.      0.   -90.     5.   1380.
  CHINA/ET.AL.   202.    15.   425.     0.      0.      0.   -78.     0.    565.
  MIDDLE EAST     85.     9.     2.     0.      0.      0.   -12.     1.     85.
  AFRICA          67.    11.    44.     0.      0.      0.   -60.     0.     62.
  LATIN AMER     208.    34.    23.     0.      0.      0.   -92.     1.    174.
  S.&E. ASIA     198.    13.   149.     0.      0.      0.  -129.     1.    232.
  ----------    ------ ------ ------ ------  ------  ------ ------ ------  ------
  ALL REGIONS   2634.   632.  2170.     1.      0.      0.  -685.     9.   4762.
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                    2025 ENERGY PRODUCTION AND USAGE REPORT
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               PRIMARY ENERGY DEMAND SUMMARY, BY REGION AND TYPE
                          (UNITS-EXAJOULES (J*10**18))
                 OIL      GAS    SOLIDS  NUCLEAR   SOLAR    HYDRO    TOTAL
               -------- -------- -------- -------- -------- -------- --------
USA              31.18    20.38    12.05     8.95    18.50     6.25    97.32
CANADA & EUR     16.19    19.83     6.19     8.26    14.97    12.24    77.67
OECD PACIFIC     10.00     5.02     4.68     3.29     5.96     2.63    31.58
USSR/E. EUR.     33.23    30.00    14.91     5.93    10.75    16.40   111.21
CHINA/ET.AL.     20.24     6.20    17.57     2.37      .76    15.90    63.03
MIDDLE EAST       7.44     2.41      .53      .61     1.11     2.12    14.23
AFRICA            8.37     2.91     2.35      .00      .00     3.88    17.51
LATIN AMER       16.39     5.43     2.47     1.13     2.05    20.84    48.31
S.&E. ASIA       14.70     6.30    10.20     3.86     7.00    13.17    55.24
               -------- -------- -------- -------- -------- -------- --------
ALL REGIONS     157.75    98.48    70.95    34.40    61.10    93.43   516.10

               PRIMARY ENERGY SUPPLY SUMMARY, BY REGION AND TYPE
                          (UNITS-EXAJOULES (J*10**18))
                 OIL      GAS    SOLIDS  NUCLEAR   SOLAR    HYDRO    TOTAL
               -------- -------- -------- -------- -------- -------- --------
USA                .04     4.52     5.10     8.95    18.50     6.25    43.37
CANADA & EUR     19.90    14.54    10.90     8.26    14.97    12.24    80.80
OECD PACIFIC       .04     3.20     2.16     3.29     5.96     2.63    17.29
USSR/E. EUR.     49.01    38.69     9.27     5.93    10.75    16.40   130.04
CHINA/ET.AL.      7.93     3.01     8.37     2.37      .76    15.90    38.34
MIDDLE EAST      29.03     8.95     1.37      .61     1.11     2.12    43.18
AFRICA           24.09     2.21     8.61      .00      .00     3.88    38.79
LATIN AMER       21.77    16.94    11.28     1.13     2.05    20.84    74.01
S.&E. ASIA        5.91     6.42    13.89     3.86     7.00    13.17    50.26
               -------- -------- -------- -------- -------- -------- --------
ALL REGIONS     157.73    98.48    70.93    34.40    61.10    93.43   516.06
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                    2025 ENERGY USE PER DOLLAR GNP AND PER CAPITA
                    *********************************************

   REGION      POPUL. BASE GNP FINAL GNP ENERGY USE    E/GNP     E/CAPITA   GNP/CAP
               (MIL)  (BIL 1988 US DOL) (EXAJOULES) J*10**9/$ J*10**9/CAP  $/CAP
------------ ------- ---------------- ----------- --------- ----------- -------
USA             289.   12840.   12572.      97.32       7.74     336.74   43502.
CANADA & EUR    483.   16346.   16028.      77.67       4.85     160.81   33184.
OECD PACIFIC    166.    4462.    4390.      31.58       7.20     190.23   26448.
USSR/E. EUR.    500.   12748.   11726.     111.21       9.98     222.42   23452.
CHINA/ET.AL.   1728.    6912.    6100.      63.03      10.33      36.47    3530.
MIDDLE EAST     277.    3324.    3444.      14.23       4.13      51.36   12434.
AFRICA         1498.    3182.    3056.      17.51       5.73      11.69    2040.
LATIN AMER      715.    6278.    5744.      48.31       8.41      67.57    8032.
S.&E. ASIA     2534.    6096.    5558.      55.24       9.94      21.80    2194.
------------ ------- ---------------- ----------- --------- ----------- -------
ALL REGIONS    8190.   72188.   68618.     516.10       7.52      63.02    8378.

                              2025 CO2 EMISSIONS REPORT
                              *************************
                    CO2 EMISSIONS BY REGION AND PRIMARY ENERGY SOURCE
                              UNITS:  10**6 TONNES OF CARBON
                             CONSUMPTION                          PRODUCTION
  REGION          OIL     GAS    COAL  SYNOIL   SYNGAS    SHALE  BIOMASS FLARING   TOTAL
  ----------    ------  ------  ------  ------   ------   ------  ------  ------  ------
  USA             588.    273.    284.      0.       0.       0.   -121.      0.   1024.
  W EUR + CAN     297.    266.    146.      0.       0.       0.   -259.      2.    450.
  OECD PACIFIC    179.     67.    110.      0.       0.       0.    -51.      0.    305.
  USSR/E. EUR.    596.    402.    351.      0.       0.       0.   -221.      4.   1132.
  CHINA/ET.AL.    372.     83.    413.      0.       0.       0.   -199.      0.    669.
  MIDDLE EAST     126.     32.     13.      0.       0.       0.    -33.      1.    139.
  AFRICA          160.     39.     55.      0.       0.       0.   -205.      0.     50.
  LATIN AMER      302.     73.     58.      0.       0.       0.   -268.      2.    166.
  S.&E. ASIA      267.     84.    240.      0.       0.       0.   -331.      1.    262.
  ----------    ------  ------  ------  ------   ------   ------  ------  ------  ------
  ALL REGIONS    2887.   1320.   1670.      0.       0.       0.  -1689.     10.   4198.
```

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                 2050 ENERGY PRODUCTION AND USAGE REPORT
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            PRIMARY ENERGY DEMAND SUMMARY, BY REGION AND TYPE
                       (UNITS-EXAJOULES (J*10**18))
                OIL      GAS     SOLIDS  NUCLEAR   SOLAR    HYDRO    TOTAL
              -------- -------- -------- -------- -------- -------- --------
USA              27.41    17.49    10.00     6.10    18.40     6.36    85.76
CANADA & EUR     11.42    18.87     7.88     5.57    16.80    12.26    72.80
OECD PACIFIC      7.48     6.08     4.70     2.27     6.84     2.66    30.04
USSR/E. EUR.     24.07    34.72    12.41     3.69    11.12    17.22   103.23
CHINA/ET.AL.     14.84    14.88    14.71     1.49     4.50    19.53    69.95
MIDDLE EAST       6.70     3.18     1.22     1.14     3.44     2.11    17.79
AFRICA            7.60     6.29     4.21      .00      .00     5.12    23.22
LATIN AMER       14.90     5.73     3.46     1.16     3.49    22.41    51.15
S.&E. ASIA       12.98     8.56    16.16     4.23    12.74    14.23    68.90
              -------- -------- -------- -------- -------- -------- --------
ALL REGIONS     127.40   115.80    74.76    25.65    77.33   101.89   522.83

            PRIMARY ENERGY SUPPLY SUMMARY, BY REGION AND TYPE
                       (UNITS-EXAJOULES (J*10**18))
                OIL      GAS     SOLIDS  NUCLEAR   SOLAR    HYDRO    TOTAL
              -------- -------- -------- -------- -------- -------- --------
USA                .08     9.75     4.38     6.10    18.40     6.36    45.07
CANADA & EUR      8.70    11.67     9.83     5.57    16.80    12.26    64.84
OECD PACIFIC       .09      .72     2.16     2.27     6.84     2.66    14.74
USSR/E. EUR.      5.24    33.97     9.44     3.69    11.12    17.22    80.67
CHINA/ET.AL.      4.77     9.08    10.06     1.49     4.50    19.53    49.43
MIDDLE EAST      85.30    33.57     1.83     1.14     3.44     2.11   127.40
AFRICA           12.64     7.46     8.83      .00      .00     5.12    34.05
LATIN AMER       10.57     7.15    10.51     1.16     3.49    22.41    55.28
S.&E. ASIA         .00     2.42    17.72     4.23    12.74    14.23    51.33
              -------- -------- -------- -------- -------- -------- --------
ALL REGIONS     127.39   115.80    74.76    25.65    77.33   101.89   522.83
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                  2050 ENERGY USE PER DOLLAR GNP AND PER CAPITA
                  *********************************************


   REGION      POPUL.  BASE GNP FINAL GNP ENERGY USE   E/GNP     E/CAPITA   GNP/CAP
               (MIL)  (BIL 1988 US DOL) (EXAJOULES) J*10**9/$ J*10**9/CAP  $/CAP
------------ ------- ----------------- ----------- --------- ----------- -------
USA             285.   21256.   20422.      85.76       4.20     300.90   71656.
CANADA & EUR    478.   29058.   27914.      72.80       2.61     152.30   58396.
OECD PACIFIC    165.    8102.    7828.      30.04       3.84     182.05   47442.
USSR/E. EUR.    521.   27038.   23718.     103.23       3.85     198.13   45524.
CHINA/ET.AL.   1866.   16456.   13856.      69.95       5.05      37.49    7426.
MIDDLE EAST     359.    9154.    9730.      17.79       1.83      49.56   27104.
AFRICA         2026.    8614.    7768.      23.22       2.99      11.46    3834.
LATIN AMER      829.   14018.   11996.      51.15       4.27      61.70   14470.
S.&E. ASIA     2998.   16662.   14228.      68.90       4.84      22.98    4746.
------------ ------- ----------------- ----------- --------- ----------- -------
ALL REGIONS    9527.  150358.  137460.     522.83       3.80      54.88   14428.

                         2050 CO2 EMISSIONS REPORT
                         *************************
                 CO2 EMISSIONS BY REGION AND PRIMARY ENERGY SOURCE
                      UNITS:  10**6 TONNES OF CARBON
                    CONSUMPTION                            PRODUCTION
 REGION           OIL     GAS    COAL  SYNOIL   SYNGAS   SHALE BIOMASS FLARING  TOTAL
 ----------     ------  ------  ------  ------   ------  ------  ------  ------  ------
 USA             521.    234.    220.      0.       0.      0.   -101.      1.    875.
 W EUR + CAN     217.    253.    173.      0.       0.      0.   -227.      1.    418.
 OECD PACIFIC    136.     82.    104.      0.       0.      0.    -50.      0.    271.
 USSR/E. EUR.    440.    465.    273.      0.       0.      0.   -218.      4.    964.
 CHINA/ET.AL.    281.    200.    324.      0.       0.      0.   -232.      1.    573.
 MIDDLE EAST     113.     43.     29.      0.       0.      0.    -44.      4.    145.
 AFRICA          150.     84.     93.      0.       0.      0.   -204.      1.    124.
 LATIN AMER      283.     77.     76.      0.       0.      0.   -243.      1.    194.
 S.&E. ASIA      250.    115.    356.      0.       0.      0.   -409.      0.    312.
 ----------     ------  ------  ------  ------   ------  ------  ------  ------  ------
 ALL REGIONS    2391.   1553.   1649.      0.       0.      0.  -1729.     12.   3876.
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                    . 2075 ENERGY PRODUCTION AND USAGE REPORT
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               PRIMARY ENERGY DEMAND SUMMARY, BY REGION AND TYPE
                          (UNITS-EXAJOULES (J*10**18))
                  OIL      GAS     SOLIDS   NUCLEAR    SOLAR     HYDRO     TOTAL
               -------- -------- -------- -------- -------- -------- --------
USA              23.11    16.29     8.79     5.51    15.12     6.35    75.17
CANADA & EUR      9.08    18.86     8.13     5.63    15.45    12.22    69.37
OECD PACIFIC      5.85     6.03     4.65     2.14     5.88     2.65    27.21
USSR/E. EUR.     17.36    36.78    11.78     2.90     7.98    17.21    94.02
CHINA/ET.AL.     10.46    15.99    15.95      .79     2.16    19.90    65.24
MIDDLE EAST       6.70     3.98     1.51     1.36     3.75     2.10    19.40
AFRICA            6.78     7.79     5.90      .00      .00     4.64    25.11
LATIN AMER       11.42     6.05     2.78      .57     1.57    22.44    44.83
S.&E. ASIA       10.14     9.97    19.80     4.81    13.21    14.26    72.18
               -------- -------- -------- -------- -------- -------- --------
ALL REGIONS     100.90   121.74    79.29    23.71    65.11   101.77   492.53

               PRIMARY ENERGY SUPPLY SUMMARY, BY REGION AND TYPE
                          (UNITS-EXAJOULES (J*10**18))
                  OIL      GAS     SOLIDS   NUCLEAR    SOLAR     HYDRO     TOTAL
               -------- -------- -------- -------- -------- -------- --------
USA                .11    12.90     4.10     5.51    15.12     6.35    44.08
CANADA & EUR     10.38     2.88    10.08     5.63    15.45    12.22    56.63
OECD PACIFIC       .13     1.04     2.06     2.14     5.88     2.65    13.89
USSR/E. EUR.      9.46    10.36     9.95     2.90     7.98    17.21    57.87
CHINA/ET.AL.      3.20     4.43    10.83      .79     2.16    19.90    41.32
MIDDLE EAST      57.37    69.28     2.13     1.36     3.75     2.10   135.99
AFRICA           10.46    13.01     9.47      .00      .00     4.64    37.59
LATIN AMER        9.76     5.02    10.67      .57     1.57    22.44    50.04
S.&E. ASIA         .03     2.82    20.00     4.81    13.21    14.26    55.13
               -------- -------- -------- -------- -------- -------- --------
ALL REGIONS     100.90   121.74    79.29    23.71    65.11   101.77   492.53
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              2075 ENERGY USE PER DOLLAR GNP AND PER CAPITA
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   REGION     POPUL. BASE GNP FINAL GNP ENERGY USE   E/GNP    E/CAPITA   GNP/CAP
              (MIL)  (BIL 1988 US DOL) (EXAJOULES) J*10**9/$ J*10**9/CAP  $/CAP
------------ ------- ---------------- ----------- --------- ----------- -------
USA             283.   31458.   29864.     75.17       2.52     265.62  105524.
CANADA & EUR    476.   47594.   45090.     69.37       1.59     145.73   94728.
OECD PACIFIC    164.   12456.   11886.     27.21       2.29     165.89   72480.
USSR/E. EUR.    536.   51746.   44178.     94.02       2.13     175.42   82420.
CHINA/ET.AL.   1919.   32886.   26952.     65.24       2.42      34.00   14046.
MIDDLE EAST     399.   20688.   22196.     19.40       0.88      48.61   55628.
AFRICA         2336.   17236.   14974.     25.11       1.68      10.75    6410.
LATIN AMER      869.   25164.   20738.     44.83       2.16      51.59   23864.
S.&E. ASIA     3194.   36998.   30408.     72.18       2.38      22.60    9520.
------------ ------- ---------------- ----------- --------- ----------- -------
ALL REGIONS   10176.  276228.  246286.    492.53       2.00      48.40   24202.

                        2075 CO2 EMISSIONS REPORT
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             CO2 EMISSIONS BY REGION AND PRIMARY ENERGY SOURCE
                        UNITS:  10**6 TONNES OF CARBON
                  CONSUMPTION                              PRODUCTION
  REGION         OIL     GAS    COAL  SYNOIL   SYNGAS   SHALE BIOMASS FLARING  TOTAL
  ---------    ------  ------  ------  ------  ------  ------  ------  ------ ------
  USA           451.    218.    168.      0.      0.      0.    -89.      1.   749.
  W EUR + CAN   187.    253.    155.      0.      0.      0.   -219.      0.   376.
  OECD PACIFIC  111.     81.     89.      0.      0.      0.    -45.      0.   236.
  USSR/E. EUR.  336.    493.    225.      0.      0.      0.   -217.      1.   838.
  CHINA/ET.AL.  219.    215.    304.      0.      0.      0.   -236.      0.   502.
  MIDDLE EAST   114.     53.     29.      0.      0.      0.    -46.      8.   157.
  AFRICA        145.    104.    112.      0.      0.      0.   -206.      1.   157.
  LATIN AMER    235.     81.     53.      0.      0.      0.   -232.      1.   138.
  S.&E. ASIA    233.    134.    377.      0.      0.      0.   -435.      0.   309.
  ---------    ------  ------  ------  ------  ------  ------  ------  ------ ------
  ALL REGIONS  2031.   1634.   1511.      0.      0.      0.  -1726.     13.  3463.
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                    2100 ENERGY PRODUCTION AND USAGE REPORT
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               PRIMARY ENERGY DEMAND SUMMARY, BY REGION AND TYPE
                          (UNITS-EXAJOULES (J*10**18))
                  OIL      GAS     SOLIDS  NUCLEAR   SOLAR    HYDRO    TOTAL
               -------- -------- -------- -------- -------- -------- --------
USA              19.25     9.73     8.43     6.59    16.29     6.29    66.58
CANADA & EUR      6.28    11.64     9.89     8.74    21.60    12.09    70.22
OECD PACIFIC      4.60     3.70     5.32     2.93     7.25     2.63    26.44
USSR/E. EUR.     17.16    29.58    16.39     5.26    12.99    17.14    98.52
CHINA/ET.AL.      9.25    12.40    22.54     2.04     5.03    19.86    71.12
MIDDLE EAST       7.22     3.10     2.00     2.29     5.65     2.08    22.34
AFRICA            6.71     5.79     7.88      .00      .00     5.20    25.57
LATIN AMER        8.76     3.79     3.27      .82     2.03    22.35    41.01
S.&E. ASIA        7.14     7.12    27.35     8.40    20.77    14.17    84.95
               -------- -------- -------- -------- -------- -------- --------
ALL REGIONS      86.36    86.85   103.07    37.06    91.61   101.81   506.76

               PRIMARY ENERGY SUPPLY SUMMARY, BY REGION AND TYPE
                          (UNITS-EXAJOULES (J*10**18))
                  OIL      GAS     SOLIDS  NUCLEAR   SOLAR    HYDRO    TOTAL
               -------- -------- -------- -------- -------- -------- --------
USA                .17    26.91     4.93     6.59    16.29     6.29    61.19
CANADA & EUR      5.94     6.64    12.74     8.74    21.60    12.09    67.74
OECD PACIFIC       .20     1.45     2.52     2.93     7.25     2.63    16.98
USSR/E. EUR.     17.47    24.32    13.27     5.26    12.99    17.14    90.46
CHINA/ET.AL.      3.50      .39    14.46     2.04     5.03    19.86    45.28
MIDDLE EAST      34.57      .00     3.00     2.29     5.65     2.08    47.59
AFRICA           17.16    21.01    11.90      .00      .00     5.20    55.27
LATIN AMER        7.28     4.68    13.06      .82     2.03    22.35    50.22
S.&E. ASIA         .06     1.45    27.19     8.40    20.77    14.17    72.03
               -------- -------- -------- -------- -------- -------- --------
ALL REGIONS      86.36    86.85   103.07    37.06    91.61   101.81   506.76
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                 2100 ENERGY USE PER DOLLAR GNP AND PER CAPITA
                 *********************************************

   REGION     POPUL. BASE GNP FINAL GNP ENERGY USE   E/GNP    E/CAPITA   GNP/CAP
              (MIL)  (BIL 1988 US DOL) (EXAJOULES) J*10**9/$ J*10**9/CAP  $/CAP
 ----------- ------- ---------------- ---------- --------- ----------- -------
 USA           284.   46320.   43226.      66.58      1.54     234.45   152202.
 CANADA & EUR  478.   77364.   72082.      70.22      0.98     146.91   150800.
 OECD PACIFIC  165.   18914.   17792.      26.44      1.49     160.22   107824.
 USSR/E. EUR.  545.   95162.   78564.      98.52      1.26     180.77   144156.
 CHINA/ET.AL. 1933.   60920.   48008.      71.12      1.48      36.79    24836.
 MIDDLE EAST   411.   40472.   43894.      22.34      0.51      54.36   106800.
 AFRICA       2436.   28324.   23646.      25.57      1.08      10.50     9708.
 LATIN AMER    888.   39330.   31056.      41.01      1.32      46.19    34974.
 S.&E. ASIA   3281.   71200.   56178.      84.95      1.51      25.89    17122.
 ----------- ------- ---------------- ---------- --------- ----------- -------
 ALL REGIONS 10421.  478004.  414448.     506.76      1.23      48.63    39770.

                            2100 CO2 EMISSIONS REPORT
                            *************************
                   CO2 EMISSIONS BY REGION AND PRIMARY ENERGY SOURCE
                          UNITS:  10**6 TONNES OF CARBON
                        CONSUMPTION                          PRODUCTION
   REGION            OIL     GAS    COAL  SYNOIL   SYNGAS   SHALE  BIOMASS FLARING  TOTAL
   ----------       ------  ------  ------  ------  ------  ------  ------  ------  ------
   USA               406.    131.    121.     0.      0.      0.     -96.      3.    564.
   W EUR + CAN       170.    162.    142.     0.      0.      0.    -248.      1.    226.
   OECD PACIFIC       98.     51.     76.     0.      0.      0.     -49.      0.    176.
   USSR/E. EUR.      362.    402.    236.     0.      0.      0.    -259.      3.    744.
   CHINA/ET.AL.      238.    174.    324.     0.      0.      0.    -282.      0.    454.
   MIDDLE EAST       125.     43.     29.     0.      0.      0.     -59.      0.    138.
   AFRICA            149.     79.    113.     0.      0.      0.    -232.      2.    111.
   LATIN AMER        219.     55.     47.     0.      0.      0.    -255.      1.     66.
   S.&E. ASIA        252.    107.    393.     0.      0.      0.    -530.      0.    222.
   ----------       ------  ------  ------  ------  ------  ------  ------  ------  ------
   ALL REGIONS      2018.   1203.   1481.     0.      0.      0.   -2009.      9.   2703.
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                    SUMMARY ENERGY PRODUCTION AND USAGE REPORT
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                  PRIMARY ENERGY DEMAND, BY REGION AND PERIOD
                           (UNITS-EXAJOULES (J*10**18))

                      1975      2000      2025      2050      2075      2100
                    --------  --------  --------  --------  --------  --------
USA                   66.67     77.05     97.32     85.76     75.17     66.58
CANADA & EUR          39.59     59.50     77.67     72.80     69.37     70.22
OECD PACIFIC          20.49     28.83     31.58     30.04     27.21     26.44
USSR/E. EUR.          59.45     89.51    111.21    103.23     94.02     98.52
CHINA/ET.AL.          19.52     35.81     63.03     69.95     65.24     71.12
MIDDLE EAST            3.78      7.01     14.23     17.79     19.40     22.34
AFRICA                 5.29      7.48     17.51     23.22     25.11     25.57
LATIN AMER            11.21     25.92     48.31     51.15     44.83     41.01
S.&E. ASIA             9.78     24.82     55.24     68.90     72.18     84.95
                    --------  --------  --------  --------  --------  --------

ALL REGIONS          235.78    355.91    516.10    522.83    492.53    506.76

                  PRIMARY ENERGY SUPPLY, BY REGION AND PERIOD
                           (UNITS-EXAJOULES (J*10**18))

                      1975      2000      2025      2050      2075      2100
                    --------  --------  --------  --------  --------  --------
USA                   63.15     35.17     43.37     45.07     44.08     61.19
CANADA & EUR          31.26     47.94     80.80     64.84     56.63     67.74
OECD PACIFIC           5.90     12.06     17.29     14.74     13.89     16.98
USSR/E. EUR.          62.15    100.49    130.04     80.67     57.87     90.46
CHINA/ET.AL.          19.12     22.32     38.34     49.43     41.32     45.28
MIDDLE EAST           42.77     46.17     43.18    127.40    135.99     47.59
AFRICA                13.34     31.75     38.79     34.05     37.59     55.27
LATIN AMER            12.83     42.35     74.01     55.28     50.04     50.22
S.&E. ASIA             7.84     17.33     50.26     51.33     55.13     72.03
                    --------  --------  --------  --------  --------  --------
ALL REGIONS          258.37    355.57    516.06    522.83    492.53    506.76
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ENERGY USE PER CAPITA, BY REGION AND PERIOD
EXAJOULES(J*10**18) PER CAPITA

	1975	2000	2025	2050	2075	2100
USA	311.55	288.58	336.74	300.90	265.62	234.45
CANADA & EUR	97.76	129.62	160.81	152.30	145.73	146.91
OECD PACIFIC	160.12	200.19	190.23	182.05	165.89	160.22
USSR/E. EUR.	150.52	197.15	222.42	198.13	175.42	180.77
CHINA/ET.AL.	21.43	25.43	36.47	37.49	34.00	36.79
MIDDLE EAST	46.66	40.98	51.36	49.56	48.61	54.36
AFRICA	13.25	8.58	11.69	11.46	10.75	10.50
LATIN AMER	35.80	48.90	67.57	61.70	51.59	46.19
S.&E. ASIA	8.65	13.36	21.80	22.98	22.60	25.89
ALL REGIONS	59.30	57.75	63.02	54.88	48.40	48.63

ENERGY USE PER DOLLAR GNP, BY REGION AND PERIOD
EXAJOULES(J*10**18) PER 1988 US DOLLAR GNP

	1975	2000	2025	2050	2075	2100
USA	21.94	11.70	7.74	4.20	2.52	1.54
CANADA & EUR	10.89	7.11	4.85	2.61	1.58	0.98
OECD PACIFIC	17.48	11.64	7.20	3.84	2.79	1.49
USSR/E. EUR.	30.76	16.90	9.49	4.35	2.13	1.26
CHINA/ET.AL.	30.16	17.60	10.33	5.05	2.42	1.48
MIDDLE EAST	13.66	7.30	4.13	1.83	0.88	0.52
AFRICA	17.09	8.44	5.73	2.99	1.68	1.08
LATIN AMER	17.76	12.65	8.41	4.27	2.16	1.32
S.&E. ASIA	20.93	14.71	9.94	4.84	2.38	1.51
ALL REGIONS	19.47	11.73	7.52	3.81	2.00	1.22

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                           SUMMARY ENERGY PRODUCTION AND USAGE REPORT
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                             CARBON EMISSIONS, BY REGION AND PERIOD
                                  UNITS-10**6 TONS OF CARBON

                              1975      2000      2025      2050      2075      2100
                            --------  --------  --------  --------  --------  --------
USA                         1097.03   1190.77   1023.57    875.13    749.38    564.36
CANADA & EUR                 606.50    631.98    450.45    417.76    375.85    225.94
OECD PACIFIC                 351.66    440.93    305.45    271.23    235.82    176.00
USSR/E. EUR.                1136.99   1380.03   1132.14    963.95    838.41    743.90
CHINA/ET.AL.                 426.85    564.67    669.48    573.21    502.44    453.89
MIDDLE EAST                   71.20     85.49    139.15    144.80    157.10    138.14
AFRICA                       105.86     61.92     49.87    123.87    156.93    111.48
LATIN AMER                   172.45    174.37    166.15    193.81    137.91     66.47
S.&E. ASIA                   181.44    231.52    261.90    311.94    309.28    222.33
                            --------  --------  --------  --------  --------  --------
ALL REGIONS                 4149.98   4761.69   4198.16   3875.70   3463.13   2702.50


                                        POPULATION IN MILLONS

                              1975       2000       2025       2050       2075       2100
                           ---------  ---------  ---------  ---------  ---------  ---------
USA                          214.000    267.000    289.000    285.000    283.000    284.000
CANADA & EUR                 405.000    459.000    483.000    478.000    476.000    478.000
OECD PACIFIC                 144.000    158.000    166.000    165.000    164.000    165.000
USSR/E. EUR.                 395.000    454.000    500.000    521.000    536.000    545.000
CHINA/ET.AL.                 911.000   1408.000   1728.000   1866.000   1919.000   1933.000
MIDDLE EAST                   81.000    171.000    277.000    359.000    399.000    411.000
AFRICA                       399.000    872.000   1498.000   2026.000   2336.000   2436.000
LATIN AMER                   313.000    530.000    715.000    829.000    869.000    888.000
S.&E. ASIA                  1130.000   1858.000   2534.000   2998.000   3194.000   3281.000
                           ---------  ---------  ---------  ---------  ---------  ---------
ALL REGIONS                 3992.000   6177.000   8190.000   9527.000  10176.000  10421.000
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GNP/CAPITA IN 1988 US $ (- 2 * 1975 US $)

	1975	2000	2025	2050	2075	2100
USA	14204	24676	43502	71656	105524	152202
CANADA & EUR	8978	18238	33184	58396	94728	150800
OECD PACIFIC	9162	17206	26448	47442	72480	107824
USSR/E. EUR.	4894	11668	23452	45524	82420	144156
CHINA/ET.AL.	710	1446	3512	7426	14046	24836
MIDDLE EAST	3418	5612	12434	27104	55628	106800
AFRICA	776	1018	2040	3834	6410	9708
LATIN AMER	2016	3866	8032	14470	23864	34974
S.&E. ASIA	414	908	2194	4746	9520	17122
ALL REGIONS	3072	4954	8374	14428	24202	39770

GNP IN BILLION 1988 US $ (- 2 * 1975 US $)

	1975	2000	2025	2050	2075	2100
USA	3040	6588	12572	20422	29846	43226
CANADA & EUR	3636	8372	16028	27914	45090	72082
OECD PACIFIC	1320	2718	4390	7828	11886	17790
USSR/E. EUR.	1934	5298	11726	23718	44178	78566
CHINA/ET.AL.	646	2036	6068	13856	26954	48008
MIDDLE EAST	276	960	3444	9730	22196	43894
AFRICA	310	888	4056	7768	14974	23648
LATIN AMER	632	2048	5742	11996	20738	31056
S.&E. ASIA	468	1688	5560	14228	30406	56178
ALL REGIONS	12260	30594	68588	137460	246286	414450